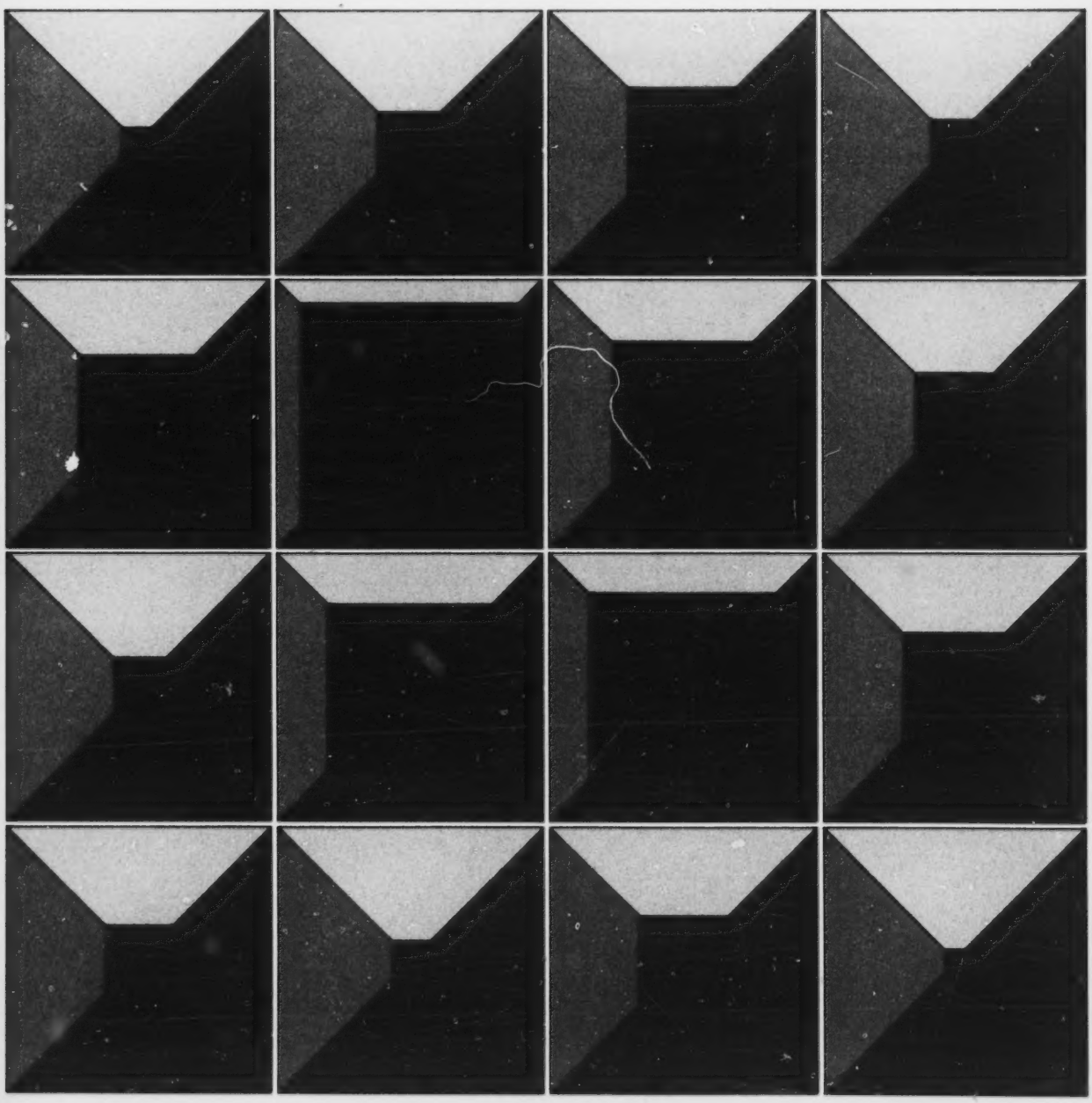
A CBO STUDY

March 1984

An Analysis of Administration Strategic Arms Reduction And Modernization Proposals

Congress of the United States
Congressional Budget Office



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AN ANALYSIS OF ADMINISTRATION STRATEGIC ARMS REDUCTION AND MODERNIZATION PROPOSALS

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NOTES

Unless otherwise indicated, all years referred to in this report are fiscal years. Likewise, unless otherwise noted, all dollar amounts are expressed in constant fiscal year 1985 budget authority dollars.

PREFACE

As the Congress continues debate this year on the Administration's plans for modernizing U.S. strategic forces, it will no doubt be mindful of the interactions between the modernization effort and the Strategic Arms Reduction Talks (START). Indeed, many of the substantive changes in previous Administration arms control proposals--most notably the "build-down" approach to arms reductions--evolved during last year's Congressional debate on the MX missile. This study, prepared at the request of the House Budget Committee, examines the consistency of the Administration's current START proposal and its plan for upgrading U.S. strategic forces. The study also estimates the effects that the current START proposal would have on the strategic capabilities of the United States and the Soviet Union.

Since the Congress exerts control over arms negotiations primarily through changes in the Administration's strategic modernization program, this study also considers alternative approaches to modernization that could be consistent with the current START proposal. Included are options that would forgo deployment of the MX missile, slow the pace of MX deployment, and alter the program for modernizing strategic bombers. These alternatives also have important effects on budgetary costs, which remain a crucial element of the defense debate. In accordance with the mandate of the Congressional Budget Office (CBO) to provide objective and impartial analysis, the study makes no recommendations.

Lawrence J. Cavaiola and Bonita J. Dombey of CBO's National Security and International Affairs Division prepared the study under the general supervision of Robert F. Hale and John J. Hamre. Bill Myers of CBO's Budget Analysis Division provided detailed cost analysis. Valuable assistance was also provided by T. Keith Glennan III, Marvin M. Smith, and Stephan Thurman. R. James Woolsey provided helpful comments. (The assistance of external reviewers implies no responsibility for the final product, which rests solely with CBO.) Francis Pierce edited the manuscript, assisted by Nancy H. Brooks.

Rudolph G. Penner
Director

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SUMMARY

The United States is expanding and modernizing its strategic nuclear forces. At the same time, it is proposing to the Soviet Union measures to reduce the nuclear arsenals of the two powers. This study addresses several key questions raised by these policies. How would the modernization plans be affected by arms reductions? What effect would modernization along with arms reductions have on the U.S.-Soviet strategic balance? Are there U.S. cost savings associated with arms reductions?

While vitally interested in arms control, the Congress as a body has little to do with the negotiating process except to pass upon treaties in the course of ratification. Its primary influence over nuclear weapons programs and policies is in deciding what weapons will be added to the arsenal and at what rates. At the same time, the modernization plan remains a focus for continued Congressional efforts to hold down defense spending to help reduce federal deficits. For these reasons, this study also considers alternatives to the modernization program that could substantially reduce costs as well as reflect Congressional intent on arms control.

Perhaps foremost among the more recent U.S. arms proposals is the "build-down" concept of arms reductions, which requires that, when new warheads are added to the inventory of nuclear weapons, an equal or larger number of existing warheads be retired. In advancing this new proposal, the United States retained its earlier call for major, mutual reductions in ballistic missile warheads to 5,000 and offered further trades of U.S. strategic bombers for Soviet ballistic missiles. In this study the revised negotiating posture is called "START/Build-down."

KEY FINDINGS

This analysis leads to the following conclusions:

- START/Build-down would allow the modernization of U.S. and Soviet forces according to current plans, but owing to the size of the reductions would require earlier retirement of many existing forces;

- These early retirements would save the United States a total of about $28.8 billion in operating and support costs through the end of the century;

- U.S. and Soviet forces would experience a decrease in the measure of strategic capability in which each currently holds an advantage--the United States in total strategic warheads and the Soviet Union in ballistic missile "throwweight" or payload--thus lessening the current disparity between the two forces;

- By many indicators the stability of the forces of both sides in a crisis would improve--that is, there would be a reduction in the incentive to launch capable but vulnerable land-based missiles before they could be destroyed;

- If the START/Build-down proposals were modified in the course of negotiations to permit a higher warhead limit than the United States now proposes, many more of the current force imbalances would remain. On the other hand, if the two powers agreed to a stricter build-down with respect to planned modernization, both sides might need to delay or alter their modernization plans.

The Congressional Budget Office (CBO) has also estimated the effects on costs if the Congress decided to reduce spending on certain strategic programs. Cancelling further production of the MX, for example, could save about $14 billion over the next five years. Alternatively, the Congress could hold MX procurement to 21 missiles per year--the amount it approved for 1984--while negotiating an arms agreement. This would save $4.4 billion over the next five years; greater savings could occur if an agreement subsequently prompted cancellation of the MX. Savings might also be generated by altering the course of strategic bomber force modernization. The study assesses the effects of these changes on strategic capabilities as well as their compatibility with arms control.

ASSUMPTIONS ABOUT START/BUILD-DOWN

The current U.S. negotiating position in START is a modification of its previous position in order to include the concept of build-down put forward by several members of Congress. The proposal is not always specific and is, of course, subject to negotiation. For analytical purposes, CBO assumed the following provisions would be part of a U.S.-Soviet agreement; most of these are included in the U.S. negotiating position:

- Acceptance of the U.S. proposal to reduce the arsenals of both sides to 5,000 ballistic missile warheads, with cuts of about 5 percent a year assumed over a ten-year period beginning in 1985;

- A concurrent build-down mechanism requiring retirement of two existing missile warheads for each new Multiple Independently-

Targetable Reentry Vehicle (MIRV) warhead on a land-based Intercontinental Ballistic Missile (ICBM); three warhead retirements for each two new warheads on a multiple-warhead submarine-launched ballistic missile (SLBM); and one warhead for each new warhead deployed on a single-warhead missile;

- The amount of the annual missile warhead reduction to be determined by the larger of either the guaranteed annual reduction of about 5 percent per year or the reduction called for by the build-down mechanism;

- A reduction in strategic bombers to an assumed level of no more than 300, and a ceiling on air-launched cruise missiles of no more than 3,500;

- Use of the weapons-counting procedures of the SALT II agreement.

U.S. AND SOVIET MODERNIZATION PLANS

Both the United States and the Soviet Union are engaged in modernizing their strategic forces. U.S. plans call for deployment before the year 2000 of:

- Two new ICBMs (the MX and a new, single-warhead small ICBM);

- Two new strategic bombers (the B-1B and the "Stealth" bomber);

- A new, accurate SLBM (the Trident II);

- More new Trident submarines; and

- Thousands of cruise missiles of various types.

The Soviet Union has already undertaken a substantial quantitative and qualitative buildup in the last decade and, although considerable uncertainty exists about future plans, appears to be continuing its efforts. Except where noted, CBO assumes that the Soviets would maintain the recent pace of their modernization plans and so would deploy the following systems, mostly by the mid-to-late 1980s:

- An MX-equivalent ICBM--the SS-X-24--probably based in fixed silos but possibly in a "mobile" basing mode that would allow it to be shuttled about so as to minimize its chance of destruction during a nuclear attack;

- A small ICBM--the SS-X-25--probably deployed as a mobile missile;
- Continued deployment of Typhoon ballistic missile submarines armed with MIRVed SS-N-20 SLBMs;
- A new, large strategic bomber--the Blackjack--armed with a new air-launched cruise missile; and
- Modernized versions of the currently deployed SS-18, SS-19, and SS-N-18 ballistic missiles.

EFFECTS OF START/BUILD-DOWN

Assuming that the START negotiations led to an agreement containing the provisions outlined above, what would be the effects on the nuclear balance?

Modernization Plans Could Continue

Because it would generally not prohibit or impose numerical limitations on specific systems, START/Build-down would allow both the U.S. and Soviet modernization efforts to continue. But it would require many existing systems to be retired earlier than currently planned. All 1,000 U.S. Minuteman ICBMs, for example, might have to be decommissioned by the mid-1990s, well in advance of their anticipated retirements.

Except where noted, CBO's analysis assumes that the planned U.S. and assumed Soviet modernization plans would be carried out. This seems consistent with the high priority assigned to strategic modernization by the Administration and, apparently, by the Soviets.

Some Cost Savings Likely

Early retirements resulting from modernization under START/Build-down would reduce costs. Strategic program costs would be lower by a total of about $28.8 billion through the end of the century, primarily because of reduced operating and support costs. But annual savings over the five-year period 1985-1989 would average roughly $0.9 billion, about 1.6 percent of total estimated U.S. strategic costs. (Estimated strategic costs include investment and operating costs directly identified with strategic forces as well as an allocation of indirect costs such as intelligence and communica-

tions, logistics, base operating support, and personnel support. The estimates are based on approximations made last year, since details of direct and indirect costs beyond 1984 are not yet available for the Administration's latest five-year defense plan. The costs should, however, provide a rough guide to likely totals under the latest program.)

Force Imbalances Likely to Decrease

Assuming continued modernization, START/Build-down would cause the United States and the Soviet Union to experience reductions in those strategic capability measures where each currently holds an advantage: the United States in total strategic warheads and the Soviet Union in ballistic missile throwweight (a measure of missile payload that indicates the potential for adding more or more powerful warheads). The Summary Figure shows that by the mid-1990s total U.S. strategic warheads--including weapons on bombers--would decrease by around 30 percent relative to 1984 levels, with only a small decrease in U.S. ballistic missile throwweight. The U.S. advantage in total warheads would shrink from 42 percent today to about 16 percent. Soviet throwweight, on the other hand, would be expected to decrease by over 55 percent from present levels, reducing its current advantage in this measure from 3-to-1 to 1.5-to-1. Numerically, then, the forces would become more similar over time, which some analysts believe would do much to improve the balance between them, and so to improve deterrence.

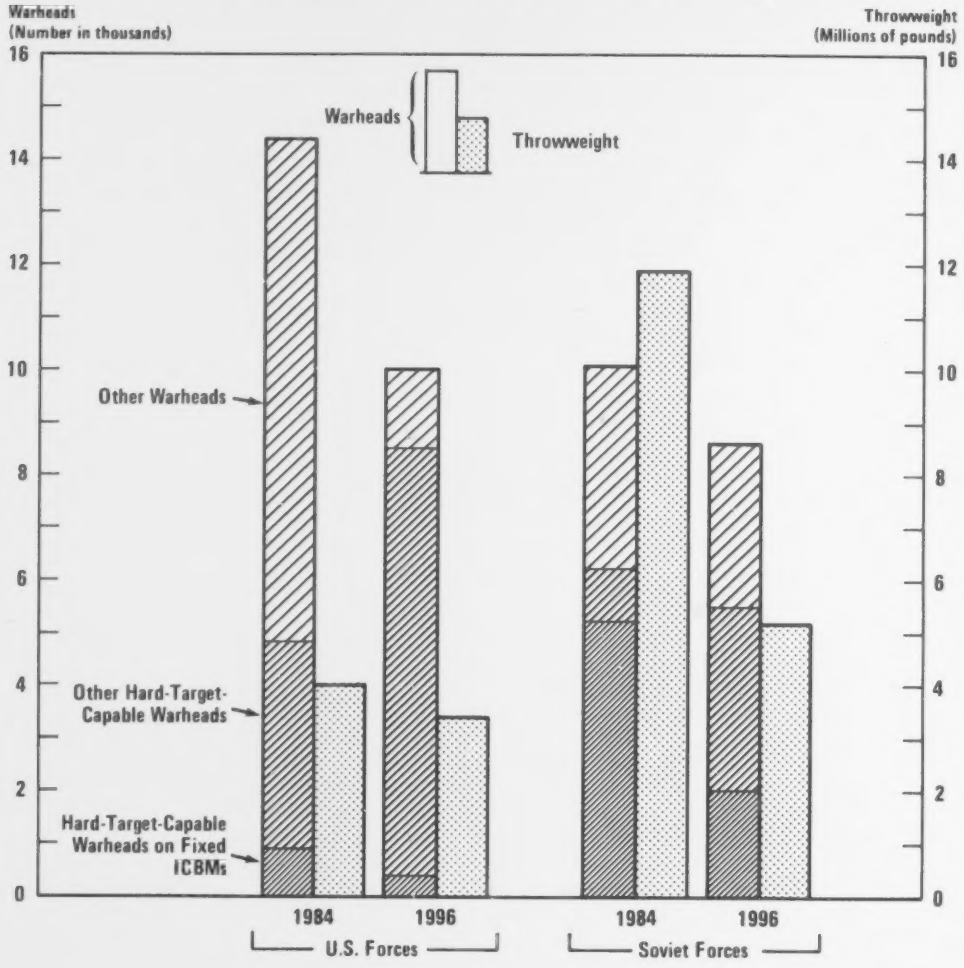
Reductions in warheads and throwweight would be even more substantial when measured against planned levels in the 1990s, rather than against today's levels as above.

Crisis Stability Should Improve

Despite some trends to the contrary, START/Build-down should also improve crisis stability--that is, there should be a reduction on both sides in the pressure to launch first in a crisis in order to avoid the destruction of vulnerable, highly valued land-based missiles. Both sides have come to place increasing value on weapons that can destroy targets hardened against nuclear blasts--so-called hard-target warheads. Both sides--especially the Soviets--currently deploy much of this hard-target capability in fixed ICBMs, which are increasingly vulnerable to attack. The vulnerability of fixed ICBMs might actually increase under START/Build-down as they became fewer in number and therefore potential targets of more modern weapons; this would appear at first sight to decrease crisis stability. But a smaller proportion of either side's hard-target warheads would consist of

Summary Figure.

Effect of START/Build-down on U.S. and Soviet Strategic Forces



NOTE: Warhead totals are in terms of the entitlements implied by arms control counting procedures. These inflate the ballistic missile warhead totals of both sides by about 10 percent in 1984. CBO also imputes approximately 1,000 weapons to inactivated U.S. bombers. CBO assumes that the modernization plans of both sides will gradually eliminate this inflation by the mid-1990s.

fixed ICBMs by the mid-1990s: for the Soviets, 34 percent as against 84 percent today; and for the United States, 4 percent as against 19 percent today (see the Summary Figure). There would be a similar though smaller reduction in the contribution of fixed ICBMs to the subset of missile warheads that could be delivered quickly in a nuclear attack and that pose the greatest threat of a first strike. Given these trends, crisis stability should improve.

Changes Caused by Guaranteed Annual Reductions

Of the two formulas calling for reductions in warhead inventories, the guaranteed annual reduction of about 5 percent to the 5,000 ballistic missile warhead limit would be the driving force in achieving these changes. This is because the percentage formula would result annually in a larger required reduction than would the build-down formula.

Other Soviet Modernization Strategies Would Yield Similar Results

These results would not be substantially altered even if, under START/Build-down, the Soviets changed the modernization plan assumed here to attain an advantage in terms of their force structure goals. Thus if they delayed the introduction of newer, lighter missiles in order to retain existing, heavier ICBMs, they would have a temporary advantage in throw-weight; but the difference would disappear as they eventually deployed newer missiles and had to retire the older ones. If they tried to maintain the predominance of this ICBM force--which under START/Build-down would require them to accept much smaller submarine-based forces--this would provide them with more throwweight but an increasingly older force, one based to a much larger extent in fixed, increasingly vulnerable silos. Even so, continued U.S. modernization would improve the balance over what it is today.

How Changes in START/Build-down Would Alter Results

Since changes might be made in the terms of START/Build-down before an agreement was reached, it is important to estimate the effects of such changes. If the parties agreed on higher warhead plateau levels than the 5,000 of the current proposal, this would allow many more of the current force imbalances to remain. At 7,000 warheads, for example, the Soviets could retain about 54 percent more throwweight--which might leave them better able to attack small, mobile U.S. ICBMs--and many more fixed and vulnerable ICBMs, which would minimize improvements in crisis stability.

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On the other hand, a stricter set of build-down ratios that required higher reductions in warheads for the deployment of multiple-warhead missiles, and directly included bomber weapons in the build-down process--thus allowing the parties to trade missiles for bombers--could cut into the near-term modernization programs of both sides. Such cuts might lead either side to delay or alter the scope of its modernization effort. For that reason, build-down requirements like these might be more difficult to negotiate. Some analysts have suggested adding a separate build-down mechanism, incorporating both bomber and missile capabilities, in the hope of reaching equality in the destructive capacity of both forces. This could involve more difficult force structure decisions than those called for under START/Build-down.

ALTERNATIVES TO THE ADMINISTRATION'S MODERNIZATION PLAN

The broad scope and high costs of the Administration's strategic force modernization plan, especially in light of its ambitious arms control goals, might lead the Congress to consider alternatives to that plan. CBO estimates that over the next five years about $290 billion will be spent to modernize, operate, and support U.S. strategic forces. Viewed in light of the START/Build-down concept and other considerations, three alternatives suggest themselves: terminating procurement of the MX missile; slowing MX procurement; and adjusting strategic bomber modernization plans.

Alternative One: Cancel the MX Missile

This alternative would terminate the MX missile program starting in 1985, leaving only the funds for 21 missiles appropriated last year. All other parts of the Administration plan would remain in effect.

Arguments for Continuing the MX. Supporters of the MX believe that deploying 100 MX missiles in former Minuteman silos would at least partially redress the Soviet superiority in highly capable ICBMs, and would demonstrate U.S. resolve to move forward with an important modernization effort. Such resolve is vital, they say, to maintaining Soviet interest in the arms reductions process. The Administration also points to the unique military utility of a new ICBM, with its superior command and control, high readiness for attack even during peacetime, and great accuracy. The Scowcroft Commission--an independent group appointed to review the U.S. strategic program--supported these reasons for the MX, but added the caveat that its deployment should be viewed as an immediate measure to facilitate the deployment of less vulnerable, more stabilizing systems under an appropriate arms control agreement.

Arguments Against Continuing the MX. Critics of the MX argue that Soviet willingness to conclude an arms reductions agreement depends little on whether or not the MX is deployed, but rather on the broad scope of U.S. modernization efforts and the overall relative strength of the United States versus the Soviet Union. They point out that basing the MX missiles in vulnerable Minuteman silos would make than an inviting target for a Soviet preemptive strike. Unless launched on warning of a Soviet attack--a practice that current U.S. policy neither assumes nor precludes--the MX could be counted on to contribute only marginally to U.S. retaliatory capabilities. A small, mobile ICBM, on the other hand, would offer a better chance for a survivable deterrent and would therefore increase the stability of the force in time of crisis.

Arms Control Considerations. Because START/Build-down attempts to discourage deployment of multiple-warhead ICBMs, cancellation of the MX would seem consistent with the philosophy of the proposal. Moreover, under START/Build-down, most of the MX missiles deployed in the late 1980s would have to be retired in the late 1990s if the United States wanted to develop its least vulnerable assets--submarines--by expanding them to a force of 20 Trident submarines armed with the planned Trident II missile, and at the same time to field a considerable number of mobile ICBMs. Forgoing the MX would mean that 1,000 existing warheads could be retained in the near term, or that additional missiles of another kind--small ICBMs in a less vulnerable mobile basing mode, or Trident IIs--could be deployed later on.

Cost Savings. Over the next five years cancelling the MX would save $14 billion in budget authority--about 5 percent of total spending on strategic forces during this period. There would be no significant change in operating expenses, since the present Minuteman missiles would be retained in their silos.

Alternative Two: Slow the Procurement of the MX Missile

If the recent Congressional decision to begin MX procurement precludes cancellation, the Congress could hold procurement to the 1984 rate of 21 per year pending conclusion of an arms control agreement. If no agreement was reached, the program could be completed or even expanded.

Arguments for the Current Program. The arguments for not slowing procurement of the MX are mainly the same as those against cancelling it. A slowdown, it is argued, would signal a wavering of U.S. resolve. In addition, opponents of a slowdown note that program costs would probably grow if procurement was continued at less efficient rates.

Arguments for Slowing Procurement. The major attraction of this alternative is that the Congress could attain most of the benefits of the MX program noted by the Administration--adding new hard-target capability, providing bargaining incentives for the Soviets, and modernizing a vital force component--without fully committing the United States to a large number of missiles. This slower rate would also hedge against the conclusion of a START/Build-down agreement that could diminish the need for many MX missiles.

Cost Savings. MX program costs would be delayed under this approach. Compared to the Administration program, savings would be $4.4 billion over the next five years. Over the long run, however, savings would occur only if the Congress terminated the program before buying sufficient MX to deploy 100 missiles, perhaps in the event of an arms control agreement. Otherwise total costs would ultimately be greater.

Alternative Three: Alter Strategic Bomber Modernization Plans

The Congress may also wish to consider changing the Administration's plans for strategic bomber force modernization. For example, although U.S. modernization plans would probably be in consonance with all but the most stringent bomber reductions envisioned under START/Build-down, these plans might run afoul of additional limits on bombers capable of firing cruise missiles or of limits on the missiles themselves. Slowing procurement of the B-1B and/or changing the program to convert older B-52s to carry cruise missiles might be of interest if such limitations were put in place. But neither would be likely to save much money, and both might increase costs in the long run. Cancellation of the Advanced Technology or "Stealth" Bomber, which may offer the best chance for a bomber that could evade Soviet air defenses into the next century, would be unattractive unless it could be traded for more lucrative offsets--missiles or bombers--in the arms reductions process. But it would probably offer substantial cost savings well into the 1990s.

CHAPTER I. EVOLUTION OF THE U.S. PROPOSAL

In October 1983 the United States proposed a new negotiating position in the continuing Strategic Arms Reduction Talks (START) with the Soviet Union. The new position represented a merger of the Administration's previous position and the "build-down" concept put forward by several members of the Congress. Build-down requires that, when new nuclear warheads are added to the inventory of either side, an equal or larger number of old warheads must be retired. In addition to this build-down feature, the U.S. proposal also calls for significant reductions in the ballistic missile arsenals of both sides, and offers trade-offs of U.S. bomber capability for Soviet missile capability. Throughout this study, the new U.S. negotiating position is referred to as START/Build-down.

While negotiating with the Soviets over START/Build-down, the Administration intends to continue modernizing U.S. strategic forces. This modernization will improve and sometimes expand the capabilities of all three "legs" of the U.S. triad of strategic offensive forces: land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and weapons carried on bombers. Over the next five years, the United States will allocate about $290 billion in budget authority to its strategic forces out of total defense expenditures of about $1,700 billion. The Soviet Union is also continuing with improvements of its strategic forces.

Is the START/Build-down proposal consistent with the Administration's ongoing modernization program? If the proposal, or some variant of it, was accepted by both nuclear powers, how would it affect the strategic capabilities of each side? Would costs be reduced? This study addresses those issues, which have been of concern during the recent Congressional debates over arms control.

The extent of the Congressional debates shows a strong interest in arms control. Indeed, several members of the Congress have indicated that their continued support of the modernization program is contingent on forceful efforts to achieve an arms control agreement. Except for the final step of giving its consent to a treaty, the Congress has no direct role in arms control negotiations; it influences the process primarily by approving or disapproving changes in the modernization program. At the same time, the modernization plan remains a focus for continued Congressional efforts to hold down defense spending in order to help reduce federal deficits. For

these reasons, the study also considers alternative approaches to the modernization program: cancelling continued procurement of the MX missile; holding down the numbers of MX missiles procured annually; and altering the Administration's bomber plans. It examines the effects of these alternatives on the costs and capabilities of U.S. forces as well as analyzing their compatability with the START/Build-down proposal.

The remainder of this chapter provides background on the evolution of START/Build-down and briefly discusses another approach to arms control, the nuclear freeze. The chapter concludes with an introduction to the terms and key issues associated with the evaluation of START/Build-down.

THE ORIGINS OF START/BUILD-DOWN

The current U.S. negotiating position in START is largely the outcome of last year's debate over the MX missile. This led the Administration to combine its previous arms control proposals with the build-down concept sponsored by several members of Congress. The report of the President's Commission on Strategic Forces, the so-called Scowcroft Commission, also served as a catalyst.

Previous Administration Proposals

The Administration's initial proposals on strategic arms control were based on the following principles:

- Reducing the number of nuclear ballistic missile warheads on both sides;
- Improving the "crisis stability" of the nuclear forces--that is, limiting the numbers of systems that, in a crisis, might be subject to "use-or-lose" pressures because of their vulnerability to enemy attack;
- Correcting certain numerical imbalances between the forces of both sides, such as Soviet possession of a number of very large missiles;
- Allowing for modernization of aging U.S. forces and improving their capability.

These principles represent a departure from the course taken in the earlier Strategic Arms Limitation Talks (SALT). For one thing, the SALT

effort was directed mainly at constraining growth in strategic arms rather than seeking substantial reductions in them. Couched in terms of counts of missile launchers and bombers, these earlier proposals did not seek to limit nuclear warheads directly, as does START.

The initial U.S. START position, outlined in June 1982, required direct Soviet accommodation to the principles outlined above. It called for reductions to 5,000 in the number of ballistic missile warheads of both sides--a cut of about one-third in operational inventories--on no more than 850 total ballistic missiles. Furthermore, no more than 2,500 warheads were to be on land-based ICBMs. In addition to these large reductions, the proposal focused on what many believe to be a major source of instability in time of crisis: a powerful and accurate Soviet ICBM force that makes some U.S. forces vulnerable to a preemptive strike. The proposal called for reductions of over two-thirds in the number of large, modern Soviet ICBMs.

This initial proposal would have allowed the United States to continue its full modernization program, though not without extensive early retirements of existing ballistic missile systems. 1/ But it would have had far-reaching effects on the Soviet arsenal. The proposed sublimit of 2,500 ICBM warheads, plus further limits on the most modern Soviet ICBMs, would have required reducing the size of the Soviet ICBM force by more than half. The proposal would also have pushed the Soviets toward a strategic force structure more balanced between land-based and submarine-based ballistic missiles, like that of U.S. forces. Only then would the proposal have considered limits on strategic bombers, a U.S. strength.

Role of the Scowcroft Commission

Despite Soviet rejection of this initial position, it remained unchanged until shortly after the Scowcroft Commission noted that arms reduction proposals should be geared toward encouraging the deployment of systems that improve stability, not exclusively toward seeking reductions in numbers. The Commission specifically noted the contribution that a small, single-warhead ICBM could make to stability if deployed in sufficient numbers and in a "mobile" mode--that is, capable of being randomly deployed throughout a large land area. Mobility would make the small ICBM difficult to destroy; its single warhead would not constitute such an attractive target that the Soviets would go to great lengths to counter it. Thus the small

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1. See Congressional Budget Office, Modernizing U.S. Strategic Offensive Forces: The Administration's Program and Alternatives (May 1983), for details of the effects of the initial START proposal.

ICBM would provide deterrence, and its relative invulnerability would make it less subject to "use-or-lose" pressures in a crisis. In addition to the small ICBM, the Commission endorsed the MX missile--deployed in fixed silos--despite its vulnerability. The Commission saw the MX as part of a package of proposals designed to show the U.S. commitment needed to induce the Soviets to continue negotiating and to foster the eventual deployment of stabilizing systems like the small ICBM.

The Administration endorsed the Scowcroft report and modified its START position to accommodate deployment of the small ICBM. It also agreed to consider an earlier proposal of limits on bombers and air-launched cruise missiles (low-flying missiles launched from bombers). The Administration also sought to begin negotiations on measures of ballistic missile destructive capability, such as missile throwweight. 2/

The Build-down Concept

Even before the Scowcroft panel issued its report, some members of Congress endorsed an alternative means of linking force modernization with reductions in warheads. Called the build-down concept, it requires the elimination of a larger number of existing warheads each time new ones are added to the arsenal of either side.

In its original form the build-down concept encompassed both ballistic missile and bomber weapons. As proposed by Senator William Cohen in early 1983, it would have required the elimination of two older warheads whenever a new one was added. This simple two-for-one rule would have been applied to all long-range strategic systems. Weapons-counting procedures developed in the SALT II process were to be used to determine which were "new" and which were "old" warheads. The idea was to propose this relatively straightforward approach to the Soviets as a precursor agreement to the more complex START proposal, thus enabling a reductions process to get going during what many saw as a protracted negotiating period.

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2. Measures of ballistic missile destructive capability usually center on the missile's throwweight. Throwweight in the strict sense measures the weight of warheads and other devices that a missile could deliver. In a larger sense it is a measure of potential: essentially the capacity to add more warheads or, as technology improves, to carry more powerful warheads. More recently there have been attempts to devise similar indices for strategic bombers, typically by taking account of their payload capacity.

The build-down idea continued to evolve as debate and discussion on the MX missile and the Scowcroft Commission report took shape in the spring of 1983. In hearings before the Senate Foreign Relations Committee on a mutual build-down resolution (S.R. 57), supporters discussed changes in the simple two-for-one rules to provide incentives for deploying certain types of systems in preference to others. One focus of concern was the multiple-warhead ICBM, carrying Multiple Independently-Targetable Reentry Vehicles (MIRVs). (MIRVed ICBMs typically have enough warheads and accuracy to threaten many fixed targets.) Variable ratios might require, for instance, the withdrawal of three warheads for each new MIRVed ICBM warhead added, but only two removed for a new bomber warhead. The idea would be to discourage the deployment of powerful but increasingly vulnerable systems--like MIRVed ICBMs deployed in fixed locations--in favor of more survivable ones. Build-down supporters also made other proposals that they stated would provide "bounded flexibility" in negotiating an agreement with the Soviets. Among these were the notion of providing a "plateau" warhead level below which the reductions ratios would be suspended, to avoid building down to very low levels of warheads (where cheating would become more critical), and the concept of "freedom-to-mix," which meant not restricting the build-down reductions to the same type of system as was being added. Freedom-to-mix would allow changes in force structure to evolve, but would not require them.

Later, some Congressional build-down advocates advanced the notion of a "double build-down," which would require concurrent annual reductions in a comprehensive measure of strategic force destructive capability, combining missile throwweight in which the Soviets have an advantage and bomber payload in which the United States is stronger.

Congressional supporters of build-down made it clear to the Administration that a linkage between force modernization and arms reductions was essential to their support of appropriations for new systems, most notably the MX missile. The Scowcroft panel had also linked approval of MX to arms control, suggesting in addition that arms control initiatives seek explicitly to improve strategic stability. It was in this context that the Administration modified its negotiating position once again in the fall of 1983, incorporating many features of the build-down concept.

START/Build-down: The Current U.S. Negotiating Position

It is convenient to think about the current U.S. START/Build-down position in terms of those ideas that will probably become the major negotiating points with the Soviets. The proposal made to the Soviets in October 1983 reportedly includes the following elements.

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Build-down on Ballistic Missiles. This proposal incorporates a system of variable ratios for reductions, requiring retirement of two warheads for each new warhead deployed on multiple-warhead land-based ballistic missiles (MIRVed ICBMs); three retirements for each two new warheads deployed on multiple-warhead submarine-launched ballistic missiles (MIRVed SLBMs); and a one-for-one replacement for each new warhead deployed on any single-warhead ballistic missile. Reductions need not come from the same type of system as was added, but rather may come from any of the ballistic missile forces. This system of proposals is the most important contribution from the earlier build-down concepts.

Guaranteed Annual Reductions. Under START/Build-down, each side would have to reduce its arsenal of ballistic missile warheads by a minimum of about 5 percent each year. If modernization required larger reductions in any year to conform to the build-down ratios, they would take precedence. The guaranteed reductions would prevent either side from attempting to avoid the build-down by ceasing all apparent modernization.

A Plateau for Reductions. The plateau, set at the previously proposed limit of 5,000 ballistic missile warheads, would serve as a level to which both sides would reduce. After attaining this level, they would remain at or below it by one-for-one replacement of old for new warheads. There would, however, be no sublimits, such as the limit of 2,500 ICBM warheads previously proposed.

A Limitation on Bombers. All the foregoing limits pertain to ballistic missile warheads. Bomber-delivered warheads--like bombs, short-range attack missiles, and air-launched cruise missiles--are not included in the total of 5,000 warheads. The Administration has instead proposed a concurrent build-down of strategic bombers--presumably by a separate formula--and has pledged to discuss placing a limit on air-launched cruise missiles. Specifics of this proposal were not, however, included in the October 1983 package.

A Separate Build-down on Destructive Capability. The START/Build-down proposal has not yet specifically addressed negotiation of the so-called double build-down involving reductions in missile throwweight and bomber payload, favored by some Congressional supporters of build-down and accepted by the President. This element of the package could be put forward in the special build-down negotiating working group that the United States suggested as part of its proposal. Appendix B explains how such a double build-down might operate.

Counting Rules. Counting rules determine what constitutes a "new" warhead as opposed to a modification, how many warheads each system will

be assumed to carry, and so forth. These counting rules directly affect the issue of the verifiability of an agreement, because they define which systems and activities are to be observed and ultimately determine how easily a violation could be detected. 3/ At present the rules are the most ambiguous and technically difficult part of the U.S. proposal. In fact, the START/Build-down proposal does not say how the United States would negotiate rules for counting warheads; previous SALT agreements were based primarily on counting strategic launchers, while START/Build-down emphasizes warheads.

RELATIONSHIP OF START/BUILD-DOWN TO A NUCLEAR FREEZE

Many who disagree with the Administration's approach to strategic arms control find a rallying point in the nuclear freeze proposal. While the Administration urges that new weapons be built and the arsenal modernized concurrent with efforts to reduce warhead levels, supporters of a freeze demand that virtually all activities associated with deploying new weapons cease as a precursor to weapons reductions. These activities comprise testing (including missile flight testing), production, and deployment of nuclear weapons systems.

Freeze supporters argue that, without an immediate and mutual halt to weapons deployment activities, both sides will proceed to deploy new generations of weapons even more lethal and dangerous than those now in existence. These deployments might continue for years as negotiations over START/Build-down went on. They also point out some of the longer-term benefits of the freeze. For example, a ban on further missile testing--which would eliminate tests of accuracy-related improvements--would eventually erode the confidence either side might have in the capability of its force to attack first. Indeed, confidence in the capabilities of the nuclear forces in general, especially with respect to their first use, could diminish over time with effective restrictions on testing and modification. 4/

Those opposed to the freeze argue that it would serve mainly to perpetuate the instabilities of today's forces. Without the ability to deploy

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3. Appendix A shows the assumptions made about counting rules in this study.

4. A nuclear freeze could, for example, eliminate those tests of nuclear warhead accuracy and yield that would provide confidence in attacking structures--like missile silos and command bunkers--hardened against nuclear effects.

more survivable forces in the future, both sides would be forced to live with today's problems indefinitely. Indeed, conditions in the future could get worse--not better--under a freeze at reduced force levels, because having a smaller number of still vulnerable weapons might increase the incentive to use them in a crisis for fear of losing them. If defensive systems--like antisubmarine warfare and air defenses--were not simultaneously frozen, this could make submarines and bombers even more vulnerable over time. Critics go on to describe the pitfalls of attempting to negotiate a freeze: having to specify when a change represents a new system that violates the freeze rather than replacement of a faulty old system; having to separate improved capability from safety modifications; having to decide whether to allow deployment of systems that are almost built; and so on. Such problems would ultimately lead to difficulties in verification, because the language of a freeze treaty could probably never fully specify all the possible contingencies. Indeed, problems of verification may be among the most serious issues associated with the freeze proposal.

Legislatively, the freeze has been successful in the House but not in the Senate. In passing a freeze resolution in mid-1983 (H.J. Res. 13), the House showed its willingness to go along with the basic concept of a mutual and verifiable freeze. But the freeze resolution did little to clarify details about the status of systems being built, what exactly constitutes new systems, or other problems. The resolution also added provisions that would tend to make verification harder. For example, the House exempted safety-related modifications from the freeze, along with in-kind replacement of systems needed to maintain a credible deterrent. But it would be difficult to ensure that in-kind replacements or safety modifications did not result in greater capability.

Even though the House has supported a freeze, both the House and the Senate have approved Administration requests for continued procurement and modification of strategic systems that would clearly violate a freeze if enacted.

Given the lack of specificity in the freeze resolution, continued Congressional support for modernization, and the Administration's adoption of START/Build-down, this paper focuses on that approach. The remainder of this chapter discusses the pros and cons of issues that are key to evaluating START/Build-down.

IMPORTANT ISSUES RAISED BY THE ADMINISTRATION PROPOSAL

Debate on the Administration's latest START/Build-down negotiating position has focused on a number of key issues. Some of these are inherent

in any strategic arms control proposal, but others stem from the specific goals the Administration has set for itself in START/Build-down. Most of the issues summarized in this chapter are examined in later chapters in connection with the specifics of START/Build-down; this section serves as an introduction to the terms and concepts.

Would the START/Build-down Approach Lead to a More Stable Nuclear Balance?

Probably the most important of all concerns is to reduce the incentive for either side to precipitate a nuclear war in a crisis. This is a goal shared by all parties to the debate. Supporters of the Administration's approach stress the need to reduce the vulnerability of nuclear weapons as well as their number. They argue that START/Build-down could aid in this since it provides incentives to modernize with systems that would be more likely to survive attack and that would have a stabilizing effect on the nuclear balance. By the same token it would discourage modernization with destabilizing systems. Guaranteed annual reductions in combination with modernization incentives would ultimately reduce the destabilizing effect of the Soviet ICBM force and discourage future deployments of similar systems by either side. In effect, both the modernization incentives and the reduction in ballistic missile warhead levels should provide a strong incentive for both sides to deploy less vulnerable systems, thus improving crisis stability.

Critics of START/Build-down, on the other hand, argue that arsenal reductions will not in themselves necessarily promote a more stable nuclear balance. There is no guarantee, for example, that both sides would deploy more survivable forces, especially since the current proposal provides no special incentive to adopt mobile or "shuttle" basing modes that would make ICBM systems less vulnerable. And without improved survivability, reduced numbers of weapons on a smaller number of launchers could increase rather than decrease the incentive to strike first in a crisis.

Would the Administration's Proposal Result in Significant Reductions in Nuclear Weapons?

An agreement on START/Build-down as proposed would lead to substantial reductions in the ballistic missile arsenals of both sides. Whether it would reduce the total number of strategic nuclear warheads is less clear. Although the proposal calls for limits on strategic bombers and air-launched cruise missiles, it does not yet contain specifics about them. Depending on where the levels are set, increases in bomber weapons could offset reductions in ballistic missile warheads. Both the United States and the Soviet

Union plan to modernize their bomber forces with substantial numbers of high-capability aircraft and air-launched cruise missiles. Indeed, the Administration's modernization plan calls for an expansion in the share of U.S. strategic weapons carried by the bomber force. 5/ Further expansion in this modernization effort could diminish or eliminate the estimated 30 percent reduction in total U.S. strategic nuclear warheads under START/Build-down.

Critics of the START/Build-down concept also point out that it focuses exclusively on quantitative warhead limitations and reductions without regard to limitations on the continued qualitative improvement of strategic forces. Thus, both sides would be free--indeed, perhaps impelled--to improve the lethality of their arsenals, thereby continuing the arms race in a more technological dimension. Others note that, unless an agreement embraces emerging weapons like the sea-launched cruise missile, it may be obsolete even before it is signed. (Sea-launched cruise missiles are small, low-flying missiles that can be fired from submarines and surface ships.)

Would a START/Build-down Agreement Be Negotiable?

The negotiability of the proposal probably rests most heavily on how well it melds with existing U.S. and Soviet modernization plans and each side's willingness to accept removal of systems that are particularly onerous to its opponents. An additional attraction might be the savings it would offer from retiring existing weapons or modifying procurement plans.

START/Build-down seems to offer each side flexibility in choosing how to make reductions. 6/ There would also clearly be U.S. cost savings. Whether the Soviets rejected the initial proposal because of its terms or because of external factors such as the deployment of U.S. missiles in Europe is not known. Nonetheless, START/Build-down is still evolving and in the longer run the Soviets might still consider some version of the proposal.

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5. See CBO, Modernizing U.S. Strategic Offensive Forces, for an analysis of this shift in terms of operational weapons.

6. Because it does not yet incorporate specific proposals for trade-offs between bomber and ballistic missile forces, START/Build-down may lack some of the flexibility originally envisioned by Congressional supporters.

Would a START/Build-down Agreement Be Verifiable?

Many other issues will be important in the debate over the START/Build-down agreement, foremost among them verification. Both sides would want to be able to detect any significant violation soon enough to have time to react to it. Verification becomes especially important in light of recent charges that the Soviets may be violating provisions of past arms control agreements.

In principle, the START/Build-down agreement should be as compatible with adequate and timely verification as past agreements such as SALT II. Indeed, this study assumes that many of the detailed technical issues--such as what constitutes a new system as opposed to a modification, or what constitutes removal of a system from the inventory--would be solved on the basis of detailed rules developed during the SALT II negotiations.

The debate on verification of START/Build-down may, however, turn less on the ability to detect violations than on each side's confidence that the other will abide by a treaty. Obviously, if the United States cannot be confident that the Soviet Union will abide by earlier arms control agreements, further agreements may not be attractive whatever the U.S. ability to detect violations. The study does not attempt to address this difficult question, which may be critical to the arms control debate over the next few years.

PLAN OF THE PAPER

The paper explores in detail the effects that START/Build-down would have on modernization programs and on measures of strategic capability and stability of the nuclear balance. The paper also estimates effects on U.S. costs. Chapter II presents these results for U.S. forces. Chapter III compares results for the Soviet Union with those for the United States, and also considers what effect certain changes in the proposal would have on the outcome. Chapter IV presents alternatives to the Administration's modernization plan and assesses their effects on costs and capabilities, as well as their compatability with START/Build-down.

CHAPTER II. THE EFFECTS OF START/BUILD-DOWN ON U.S. FORCES

This chapter illustrates the influence of arms control on U.S. strategic forces by describing the effects of the Administration's modernization program over the remainder of the century, first assuming the absence of an arms control agreement and then assuming implementation of the Administration's START/Build-down proposal. Under a START/Build-down agreement, U.S. strategic forces would be fewer in number and therefore less costly than in the absence of an agreement. They would also be younger and hence more modern. Finally, they would tend to be more stable in a crisis--that is, fewer forces would be vulnerable to an enemy attack and so subject to "use or lose" pressures.

This chapter also compares projected forces under the Administration's arms control proposal with today's forces and reaches conclusions generally similar to those above. Comparison with today's forces is interesting because one current motive for arms control is dissatisfaction with the U.S.-Soviet strategic balance. This method is also used to compare arms control effects on both U.S. and Soviet forces in the next chapter.

THE ADMINISTRATION'S MODERNIZATION PLAN WITHOUT ARMS CONTROL

The Administration's strategic force modernization plan would lead to a substantial increase in nuclear weapons over the next decade. As details show, the numbers of warheads would increase about 15 percent by 1996, and throwweight would increase 55 percent in the same time period. Most older warheads would be replaced by newer, larger, and more accurate warheads--particularly in the submarine force, which heretofore has not carried weapons capable of attacking targets hardened against the destructive effects of a nuclear attack.

Scope of the Effort

The Administration's modernization plan for strategic forces involves all three of the triad forces: land-based missiles, submarine-based missiles, and strategic bombers. While not all of the details are available on an un-

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classified basis, this study assumes that modernization includes the following programs: 1/

- Deployment by 1990 of 100 MX intercontinental ballistic missiles in silos formerly housing Minuteman missiles;
- Deployment in the early 1990s of a new single-warhead small ICBM (called SICBM) in one or more basing modes;
- Deployment by the late 1980s of 100 B-1B bombers and in the early 1990s of about 125 Advanced Technology--or "Stealth"--Bombers;
- Deployment by the early 1990s of about 3,000 air-launched cruise missiles. These small, low-flying missiles would initially be carried and launched from refitted B-52 bombers and eventually from both B-52 and B-1B bombers;
- Continued procurement through 1993 of Trident submarines at the current rate of one per year to a total of 20, and deployment on most Trident submarines by 1996 of the new, larger, and more accurate Trident II (or D-5) missile currently being developed.

In addition, there have been, and continue to be, programs for maintaining and upgrading the capabilities of current forces. For instance, B-52 bombers are to receive hardening against one of the adverse effects on electronics of nuclear detonations--electromagnetic pulse; B-52 bombers will also receive capability upgrades like the offensive avionics system and updated electronic countermeasures equipment. Minuteman III intercontinental ballistic missiles are receiving refurbished third-stage motors and improvements in their guidance system.

Chronologically, the modernization plan can be characterized as a two-tiered program with some systems--the MX missile, the B-1B bomber, the air-launched cruise missile--being deployed in the period to the late 1980s, and others--the small ICBM, the Advanced Technology Bomber, the Trident II missile--in the early-to-mid-1990s. Deployment of Trident submarines would continue throughout and beyond this period.

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1. This analysis addresses the three components of the Administration modernization plan for strategic offensive forces only. See Appendix C for force structure assumptions.

Measuring Strategic Capability

The Concept of Deterrence. It is most difficult to assess the effects of the Administration's modernization plan on the primary mission of U.S. strategic forces: to deter the Soviets from venturing upon nuclear war or using their forces to coerce the United States. The measure of deterrence has to be more than numerical; it requires a judgment as to the retaliatory capability that would be necessary to convince the Soviets of the futility of using their nuclear forces.

Over the years, concepts of deterrence have changed. Under the mutual assured destruction (MAD) philosophy of the 1960s and 1970s, deterrence was based on the threat of inflicting "unacceptable damage" on the Soviet Union in response to an attack. Under this approach, U.S. retaliatory strategy evolved from one aimed primarily at destroying cities to one aimed primarily at destroying the Soviet military and economic base. Thus, over the years more facilities became potential targets, many of them difficult to destroy.

In the past few years, the MAD concept of deterrence has, in the view of many, lost its credibility. Some critics contend that Soviet military writings show a belief in the possibility of fighting a nuclear war, beginning with a series of limited strikes and counterstrikes against military targets such as missile silos or command bunkers, most of which are heavily hardened against nuclear attack. Opponents of MAD argue the need to be able additionally to respond in more flexible, perhaps limited, ways to such a limited nuclear attack, both to deter nuclear war and to prevent the Soviets from using the threat of it to gain political ends through "nuclear blackmail." The argument implies that a president faced with a limited strike against a few military targets might not be willing to unleash a massive U.S. counterattack knowing that it would call forth a similar massive response from the Soviets. If the Soviets were to believe this, they might risk launching a limited strike.

The need for a choice of ways to respond to a limited strike while at the same time maintaining the capability for a massive strike has increased the demands placed on nuclear weapons in two ways. First, the number of potential targets in the Soviet Union included in U.S. targeting plans has grown. Second, new attack strategies have been created that place greater demands on the strategic forces, such as being able to operate over a protracted period of time in many and highly selective attack options. These added demands are responsible in part for the Administration's plans to add more warheads and make those warheads better able to attack hardened

targets. More important, they put a premium on systems that will be more survivable. Greater survivability would lower Soviet confidence in the success of a first strike, and reduce the size of the arsenal needed.

Nevertheless, some do not agree that these changes in strategic doctrine, with attendant demands for more and better weapons, are needed to deter nuclear attack. They argue the implausibility of limited nuclear war or the need for striking small, selected sets of targets. Instead, they contend that simpler, more direct approaches might deter, such as having forces that could inflict great damage on things the Soviets value most highly, such as their political leadership structure. Still others argue that just having the capability to destroy a large part of an opponent's cities and industrial facilities would deter. By this last metric, both the United States and the Soviet Union have many times the numbers of nuclear warheads needed.

Most would agree that it is desirable to have "stable" nuclear forces, regardless of the debate over numbers of weapons. One aspect of stability is the absence of pressure to launch weapons first in a crisis. "Crisis stability" requires that a large number or percentage of forces on both sides be able to survive an enemy strike. Another aspect of stability is the absence of pressure to continue building more weapons or more sophisticated weapons. This "arms race" stability involves many factors, including the attitudes of both sides toward each other and the perceived capability each side has to expand its forces quickly or surreptitiously.

This paper does not try to measure the deterrent capability of any particular U.S. strategic force in the presence or absence of arms reductions. Instead, CBO estimates the effects of different approaches in terms of changes in strategic weapons inventories. Some of these changes are useful in assessing the effects of arms reductions on stability.

Measures Used in This Study. To describe and compare the effects of this far-reaching expansion, CBO used five quantitative measures of force effectiveness. They address changes in the size of the strategic forces, the stability of the forces, and the modernization of the forces. Each measure is described below:

- **Total Warheads** -- a measure of general capability against a potential set of targets. 2/

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2. This measure includes all weapons, including air-launched cruise missiles, carried by bombers, plus warheads on ICBMs and SLBMs.

- **Hard-Target Warheads** -- a subset of total warheads that measures capability against targets such as ICBM silos, communications facilities, and leadership bunkers that are hardened to withstand nuclear detonations. 3/

- **Fixed Hard-Target Warheads** -- a subset of hard-target warheads that are deployed in fixed locations, namely, ICBMs in silos, and so are increasingly vulnerable to attack by more accurate ballistic missiles. Having a lot of nuclear capability on systems vulnerable to a first strike may prompt their early use in a crisis, and hence this is one measure for comparing the crisis stability of forces.

- **Ballistic Missile Throwweight** -- a measure of the payload-carrying capability of missiles, indicating potential for increasing either the number or the size of warheads. An opponent with a throwweight advantage could, for example, secretly deploy additional warheads on a missile that has only been tested with fewer warheads. Larger warheads would increase the effectiveness of a barrage attack--an attack covering as much area for a given level of damage as possible--on enemy missile fields. This type of attack is the kind that would be most likely to threaten the survivability of a mobile missile system. To the extent that it did, it would defeat the purpose of moving away from fixed ICBMs, which was to enhance survivability and thereby increase crisis stability. Uncertainty about an opponent's capabilities engendered by excess throwweight might lead the other side to try to match this potential capability. Thus throwweight can also be an indicator of "arms race" instability--the impetus to participate in a numerical or technological arms race.

- **Average System Age** -- an index of force modernization and hence of technological sophistication. Despite its limitations as a single measure, the aging of U.S. forces has been one concern raised by the Administration in formulating its modernization plan.

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3. In this study, hard-target warheads are defined as those with at least a 50 percent probability of destroying a nominal target hardened to withstand 4,000 pounds per square inch of static overpressure. This hardness value is representative of published estimates for modern Soviet ICBM silos. See Aviation Week and Space Technology (October 12, 1981), p. 22. This subset includes warheads on some ballistic missiles, plus air-launched cruise missiles and bombs carried by strategic bombers.

Since this paper focuses on arms control, these measures are applied to inventories of weapons--or the warhead entitlements implied by arms control agreements--not to operational inventories. Arms control inventories in this paper are based for the most part on counting rules developed in the SALT II negotiations that specify, for example, the maximum number of warheads assumed to be on each launcher. 4/ These rules were laboriously developed to satisfy concerns of both sides regarding verifiability and conformity; many of their provisions are likely to be applied in any future arms control agreement. Arms control inventories generally count a delivery system as existing regardless of whether it is operational; this allows satellites, which cannot always distinguish operational from dormant systems, to verify numbers of systems. Likewise, to aid in verification, delivery systems are credited with carrying the maximum number of warheads with which they have been tested even though they may operationally carry fewer. 5/

Given today's forces, both of these assumptions--because they imply a warhead entitlement--lead to higher absolute counts on measures of effectiveness than would be the case if counting operational inventories. The effect is an inflation of roughly 10 to 15 percent in the ballistic missile warhead counts of both sides in 1984. Total U.S. warhead counts are also inflated by the attribution of about 1,000 weapons to mothballed--but accountable--B-52 bombers. Most of this inflation would disappear as the older systems on which the higher counts are based were retired. An earlier CBO report assessed the Administration's plan in terms of operational inventories. 6/

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4. One modification is that this study counts both U.S. FB-111 bombers and Soviet Backfire bombers assigned to their Long Range Air Force.

5. Thus, the United States is credited with having almost 300 extra B-52 bombers even though it is highly unlikely that they would be restored to operational use. And Poseidon (C-3) submarine-launched ballistic missiles are counted as carrying 14 warheads rather than the 10 warheads that are operationally deployed. Likewise, all Soviet SS-N-18 SLBMs are credited with having seven warheads, although many may carry only three.

6. For counts of U.S. operational inventories, see Congressional Budget Office, Modernizing U.S. Strategic Offensive Forces: The Administration's Program and Alternatives (May 1983).

Growth in Size of Forces

Total Warheads. By most of the measures just defined, the Administration's modernization plan would lead to a substantial increase in U.S. nuclear forces. The Administration's plan would, for example, substantially increase the strategic nuclear warhead inventory. Total numbers of warheads would increase from a 1984 level of about 14,300 to 17,500 by 1990--an increase of 22 percent--and, with the retirement of older systems, would decrease to 16,400 by 1996 (see Figure 1).

Along with the increase in warheads, a nearly complete modernization of weapons would take place by the end of the century. For example, by 1996 in the submarine-based forces, the large, accurate Trident II (D-5) missile would replace most of the currently deployed submarine-launched ballistic missiles (SLBMs). Trident submarines would take the place of most of the existing Poseidon submarines. The strategic bomber fleet of B-1B and Advanced Technology Bombers would replace most of the current inventory of long-range bombers. And while the plan apparently does not call for large-scale replacement in the ICBM force, more MX missiles or a new, small ICBM would eventually make up a significant fraction of that force.

Hard-Target Warheads. Growth in the subset of weapons capable of attacking hardened targets would be even more substantial. Hard-target warheads would increase from 4,800 in 1984 to 8,700 in 1990--an increase of 81 percent--and up to 11,600 in 1996, an increase of over 140 percent.

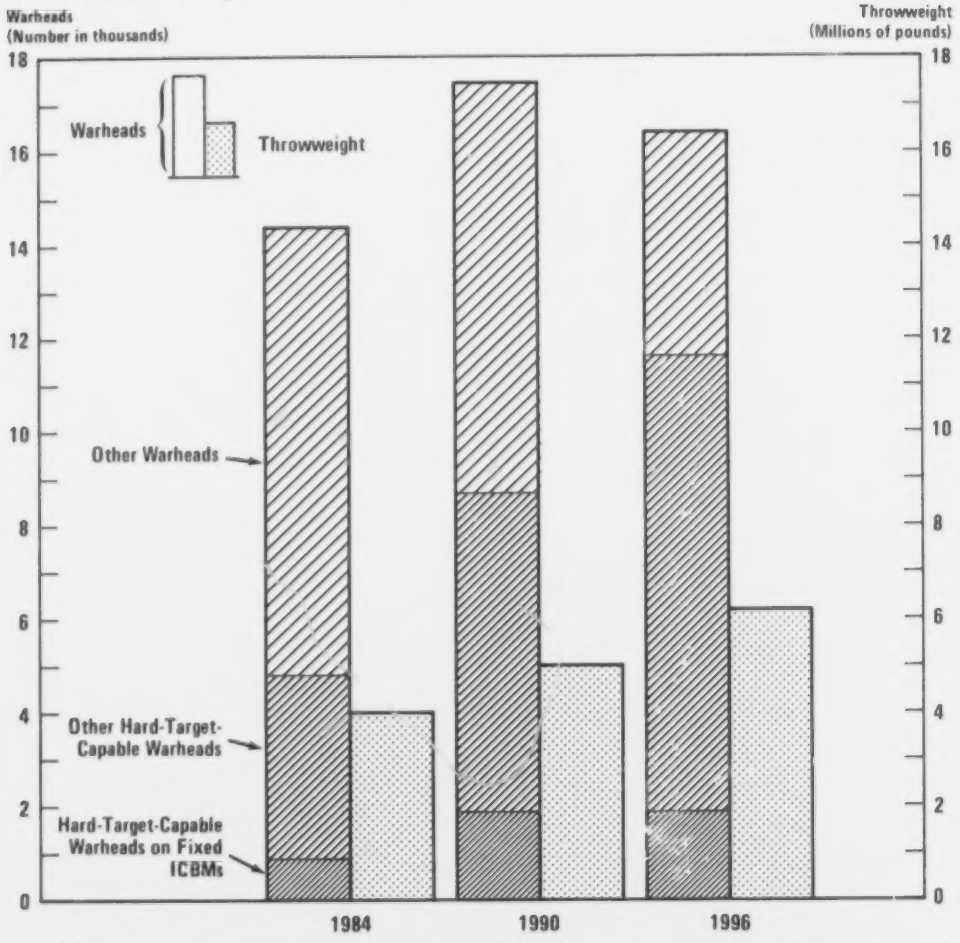
This dramatic buildup in capability would reflect both technological progress--most of it residing in the new systems--and a U.S. policy to redress the growing Soviet advantage in hard-target warheads. Proponents believe that matching Soviet increases in hard-target warheads is necessary to maintain deterrence.

Decrease in Stability of Forces

Fixed Hard-Target Warheads. While growing in numbers, U.S. forces could become less stable in a crisis. Weapons systems vulnerable to attack are considered destabilizing in a crisis because a military planner might be tempted to use them first rather than risk their loss. Consistent with this logic, the inclination to do so would be even stronger should these weapons-at-risk constitute a significant part of the strategic arsenal. MIRVed systems--with their multiple warheads per launcher--are, when vulnerable, considered additionally destabilizing. This is because an attacker need expend only one or two warheads to expect, with high probability, to destroy a

Figure 1.

The Administration's Strategic Force Modernization Plan Unconstrained by Arms Control



NOTES: Warhead totals are in terms of the entitlements implied by arms control counting procedures. These inflate the ballistic missile warhead totals of both sides by about 10 percent in 1984. CBO also imputes approximately 1,000 weapons to inactivated U.S. bombers. CBO assumes that the modernization plans of both sides will gradually eliminate this inflation by the mid-1990s.

The percentage contribution of each element of U.S. strategic forces to the warhead totals above is:

	1984	1990	1996
ICBMs	15	16	23
SLBMs	47	46	37
Bombers	38	38	40

greater proportion of his opponent's warheads: ten in the case of an MX missile.

By this logic, crisis stability would decrease in absolute terms under the Administration's modernization plan without arms control. Numbers of hard-target warheads based in fixed locations--and therefore increasingly vulnerable to accurate Soviet missiles--would grow from 900 in 1984 to 1,900 in 1990, an increase of 111 percent. This growth reflects deployment of the MX; since that deployment would end in 1990, numbers of fixed hard-target warheads would remain at this level through 1996. Furthermore, all of these warheads would be on multiple-warhead (MIRVed) systems, making them even more attractive targets. Since the requirements for deterrence--in terms of warheads able to survive a first strike and retaliate--are likely to increase in a competitive environment unconstrained by arms control, absolute increases in vulnerable weapons may increase the pressure to use them first in a crisis rather than risk their loss.

As a percentage of the total force, vulnerable weapons would actually decline. The proportion of fixed hard-target warheads to total hard-target warheads would decrease from 19 percent in 1984 to 16 percent by 1996 after a small interim increase. This modest percentage decline, however, reflects the overall buildup in numbers of weapons--particularly in the bomber force--and might not fully offset the potential crisis instability that would be induced by having more hard-target warheads based in fixed, vulnerable locations.

Ballistic Missile Throwweight. Throwweight would increase 55 percent by 1996, from 4 million pounds in 1984 to 6.2 million pounds in 1996. While in itself this increase suggests less stability in the U.S.-Soviet arms competition, U.S. throwweight would remain significantly below that of the Soviets.

Modernization

Average Age. By 1996, despite completion of most of the modernization plan, average age would generally not have decreased. The land-based and sea-based missile forces would show an increase in average age of one and five years respectively because most existing systems would be retained. The bomber force average age would, however, decrease by about three years.

If used as an absolute measure of modernization, however, average age can be misleading. By 1996, the United States will have very modern sys-

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tems in every leg of the triad. It is the retention of older systems that keeps up the average age. Perhaps the only important implication of the higher average age is that costs to maintain and upgrade these older systems are unlikely to fall. Average age is more useful as a comparative measure to show changes in the relative ages of U.S. and Soviet forces, as is done in the discussion of START/Build-down in Chapter III.

HOW START/BUILD-DOWN WOULD AFFECT THE ADMINISTRATION'S MODERNIZATION PLAN

An arms control agreement could substantially alter the foregoing findings about the size, stability, and age of U.S. strategic forces. To assess the possible effects of a START/Build-down agreement, CBO has assumed a feasible set of outcomes for the negotiations, recognizing that these are only an example of what could occur. CBO has assumed that:

- The current U.S. proposal is accepted. This would mean gradual reductions to a ceiling of 5,000 ballistic missile warheads and, since the proposal contains no specifics on bomber limits, an assumed reduction in the strategic bomber force to a ceiling of 300 together with a limit of about 3,500 on air-launched cruise missiles.

- The percentage annual reduction formula would be based upon reaching the plateau of 5,000 ballistic missile warheads through evenly phased reductions over a ten-year period, beginning in 1985, resulting in about a 5 percent annual reduction. SALT-type counting rules would apply.

- The build-down ratios formula would be based on a two-for-one reduction for multiple-warhead ICBMs; a three-for-two reduction for multiple-warhead SLBMs; and a one-for-one reduction for single-warhead ballistic missiles.

- Annual reductions would be based on the formula that yielded the largest reduction in a given year.

Effects on Administration Modernization Plan Would Be Minor If Older Systems Were Retired Sooner

If this version of the U.S. proposal was accepted, one key finding is that--with the exception of some trade-offs required in the mid-to-late 1990s--the START/Build-down proposal could accommodate the Admin-

istration plan for strategic force modernization. 7/ However, the accommodation would have to be made by the earlier and more comprehensive retirement of existing systems. All Minuteman ICBMs and their launchers would probably have to be decommissioned between 1986 and 1995; no retirements of Minuteman missiles--save for the 100 displaced by MX missiles--appear to be planned during this period in the absence of arms control constraints. Under START/Build-down limits, the existing Poseidon submarines would have to be retired, on average, about six years earlier than without arms control limits. Some additional retirements in the B-52 bomber force would also be required in the mid-1990s as the Advanced Technology Bomber was deployed and the B-1Bs became cruise missile carriers.

Costs Would Be Lower

Owing to operating and support savings from these early retirements, costs over the next 16 years would be lower by about $28.8 billion with START/Build-down than without arms control. This equates to average annual savings of about $1.8 billion. (Over the period 1985-1989, average annual spending on strategic forces is planned to be about $60 billion.)

These costs, and the rest of the analysis in this section, assume that full modernization would continue and older systems discussed above would be retired. This is consistent with the high priority the Administration accords to strategic force modernization. Alternatives to full modernization, considered in Chapter IV, could result in significantly larger savings.

U.S. Forces Would Be Smaller

As illustrated by comparing Figures 1 and 2, relative to the buildup anticipated in the absence of arms control, the Administration's START/Build-down proposal would lead to smaller forces by the quantitative measures used in this study. Measures that are correlated with technology improvements--such as hard-target capability--would decline less, since those capabilities are generally on the modernized systems that are assumed to be deployed.

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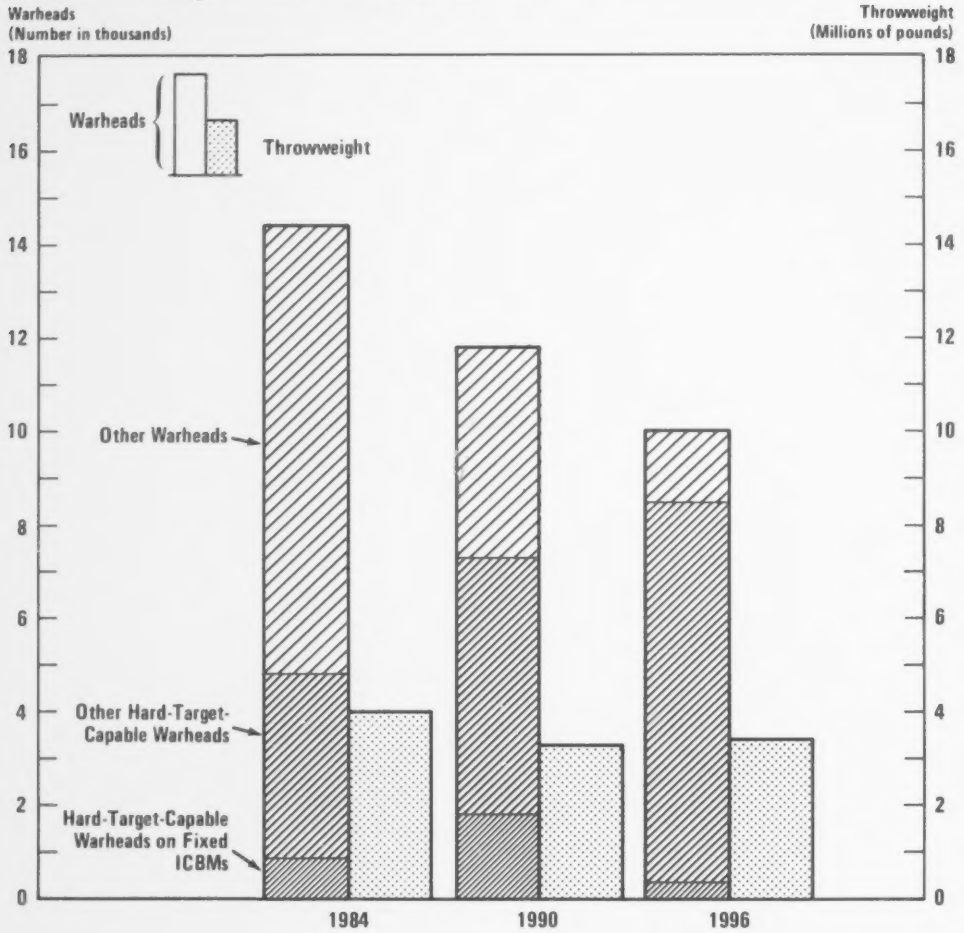
7. Should a substantial number of the new small ICBMs be deployed, either MX missiles would need to be retired or some Trident submarines would have to be forgone in the late 1990s. In its analysis, CBO assumes the former.

Figure 2.

The Administration's Strategic Force Modernization Plan Constrained by START/Build-down



NOTE: The percentage contribution of each element of U.S. strategic forces to the warhead totals above is:

	1984	1990	1996
ICBMs	15	16	14
SLBMs	47	40	36
Bombers	38	44	50

Specifically, warhead counts under START/Build-down would be lower by 33 percent in 1990 and 39 percent in 1996, with 10,000 warheads in the arsenal by 1996 as opposed to 16,400. Hard-target warhead levels would also be lower. In 1990, the United States would have 7,300 hard-target warheads under START/Build-down rather than 8,700 warheads without START/Build-down--a decrease of 16 percent. And by 1996, it would have 8,500 hard-target warheads rather than 11,600--a reduction of 27 percent. As discussed in the next chapter, these reductions would be accompanied by reductions in Soviet forces.

Stability of Forces Would Increase

Those measures associated with force stability would also improve significantly. Fixed hard-target warheads would show only a slight decrease of 5 percent by 1990, but by 1996--with the deployment of small, mobile ICBMs and retirements of Minuteman missiles in their fixed silos--fixed hard-target warheads would be 82 percent lower than in the unconstrained case. Furthermore, this vulnerable subset of warheads would constitute only 4 percent of the set of hard-target warheads as opposed to 16 percent in the unconstrained case. In conjunction with the constrained Soviet force under START/Build-down, this should indicate an improvement in crisis stability.

Throwweight would decrease from 5 million pounds to 3.3 million pounds by 1990--a reduction of 34 percent, and would be at 3.4 million pounds rather than 6.2 million pounds by 1996, or 45 percent lower. From the standpoint of "arms race" stability this would be an improvement; on the other hand, some U.S. planners have argued that U.S. forces need more missile throwweight--even at reduced weapons levels--to counter potential Soviet ballistic missile defenses.

Forces Would Be Younger

Although both the unconstrained and the START/Build-down-constrained forces would be fully modernized by the end of the century, the START/Build-down force would be substantially younger, on average, owing to retirements of older systems that would be retained in an unconstrained force. Thus, on average, the ICBM force would be about 11 years younger, the SLBM force about 6 years younger, and the bomber force about 5 years younger.

Through refurbishment, the lifetime of older systems can be extended. For example, Minuteman II missiles, now about 20 years old, could continue in operation into the next century. Nevertheless, such refurbishment can

become increasingly difficult and expensive as basic technologies become outdated. Thus, in comparison to the unconstrained force, with its greater number of older systems, less money would probably be needed to maintain the reliability and effectiveness of the more modern force under START/Build-down. In Chapter III, average age will be used to examine the effects of START/Build-down on the comparative state of modernization of U.S. and Soviet forces.

How Reductions Would Be Effected

The many changes associated with START/Build-down result, almost exclusively, from one of the two formulas in the proposal. The first formula requires that old warheads be retired as new ones are added, the number to be retired depending on the type of new warhead (two for each multiple-warhead ICBM, and so on). The second formula, based on an annual percentage reduction, requires a minimum guaranteed annual reduction in warheads irrespective of modernization. The more binding of the two formulas applies in any given year.

Given the pace and scope of the Administration's modernization plan, the binding constraint in almost all years would be the guaranteed annual reduction formula. In other words, the formula based on explicit build-down ratios would result in a smaller annual required reduction than would the percentage annual reduction with its implicit build-down. In practical terms, most of the missile reductions would come from retirements of existing ballistic missile submarines; reductions in bombers would come from existing B-52s.

With modernization, however, this guaranteed reduction formula does result in an implicit build-down. For new deployments of multiple-warhead ICBMS up to the level of reductions required by the percentage rate, the build-down would be at least two-for-one. For instance, if the percentage reduction formula called for a net decrease of 300 warheads in a given year, and no modernization was undertaken, 300 warheads would have to be retired in that year. If, however, new deployments had added, say, 300 warheads to the arsenal, then 600 warheads would have to be retired for the net reduction of 300, implying a build-down of two-for-one. For deployments above the level of reductions set by the percentage rate--in this case 300--there would be more favorable START/Build-down ratios for submarine-launched missiles (three-for-two) or single-warhead missiles (one-for-one), but new multiple-warhead ICBMs would always incur at least a two-for-one penalty.

COMPARISON OF FORCES UNDER START/BUILD-DOWN TO TODAY'S FORCE LEVELS

Since one motive for arms control arises from concern with the current strategic situation with the Soviet Union, a useful way to assess the effects of the Administration's START/Build-down proposal is to compare force levels that would result from it with today's levels. This is also the framework used to compare the effects of START/Build-down on U.S. and Soviet force levels in the next chapter.

The detailed results discussed below suggest conclusions generally similar to those reached in the previous section. The arms control proposals would result in smaller force levels than today, except that hard-target warheads would increase in number. But the resulting forces would be much younger and they would tend to be more stable in terms of both crisis stability and arms race stability.

Size of Forces

As can be seen in Figure 2, numbers of warheads would decrease from the 1984 level of 14,300 to 11,800 by 1990--a decrease of 17 percent, and would further decrease to 10,000 by 1996, a decrease of 30 percent.

Conversely, levels of hard-target warheads would significantly increase from 4,800 today to 7,300 by 1990, an increase of 52 percent, and would further increase to 8,500 by 1996, an increase of 77 percent. As discussed above, this increase reflects both technological progress and a policy decision that U.S. hard-target capability is needed to redress a perceived imbalance with Soviet capabilities.

Stability of Forces

Relative to current levels, forces under START would show improvement along both measures of stability. For crisis stability, fixed hard-target warheads would decrease 61 percent by 1996--from 900 to 350 warheads--after an interim increase of 100 percent with the deployment of the MX. Furthermore, fixed hard-target warheads would constitute only 4 percent of the set of total hard-target warheads rather than the current 19 percent. For longer-term force balance or arms race stability, throwweight would decrease 15 percent by 1996 from a current level of 4 million pounds to 3.4 million pounds.

Average Age of the Force

All but the SLBM force would be substantially younger by 1996. Since the most current SLBM was first deployed in 1979, new deployments simply maintain the relative youth of this force. The ICBM force would, however, be about ten years younger and the bomber force about eight years younger than today.

This chapter has examined effects of the Administration START/Build-down proposal on U.S. forces by comparing the forces under START/Build-down with the Administration's planned forces in the absence of arms control and with today's forces. START/Build-down would also have important effects on Soviet strategic forces and on the balance between the two superpowers. These effects are the topic of the next chapter.

CHAPTER III. COMPARATIVE EFFECTS OF START/BUILD-DOWN ON U.S. AND SOVIET FORCES

In addition to affecting U.S. forces, START/Build-down would substantially alter Soviet strategic forces. This chapter focuses on comparisons of Soviet and U.S. forces under the Administration's arms control proposal.

CBO finds that both sides would experience a decline in those measures in which they currently have an advantage: the United States in total strategic warheads, and the Soviet Union in ballistic missile throwweight. In these respects the resulting forces would be more similar in nature. There would also be an improvement in the crisis stability of the nuclear balance as measured by numbers of warheads on both sides in fixed, increasingly vulnerable silos. Most U.S. forces would, by 1996, be younger in average age than Soviet forces. These conclusions remain essentially the same for several different approaches that the Soviets could choose for modernizing their forces within the terms of an arms control agreement.

In addition, CBO explored the sensitivity of these conclusions to changes in the Administration's START/Build-down position that might come about during negotiations with the Soviets. Higher warhead plateau levels--because they would allow both modernization and retention of more existing weapons--would allow much more of the current imbalance between the forces to remain. A set of build-down ratios that placed stiffer penalties on modernizing with multiple-warhead ballistic missiles and bombers would probably lead both sides to delay or alter their modernization plans, resulting--among other things--in larger U.S. cost savings. This would happen in spite of any advantages gained from being able to trade off missile and bomber warheads.

HOW START/BUILD-DOWN WOULD ALTER THE STRATEGIC BALANCE

Key Assumptions

Because it calls both for substantial reductions in ballistic missile warheads and for a novel approach to influencing the course of future modernization, START/Build-down could have a profound effect on the strategic arms competition. Just how great this change would be depends on the shape of the final agreement and the Soviet reaction to it in force modernization programs.

Final Agreement. For purposes of analyzing effects on the Soviets, this chapter makes the same assumptions about the final START/Build-down agreement as were made in Chapter II. In general, these assumptions imply that the Soviets accept the U.S. proposal. This means reductions in numbers of ballistic missile warheads to 5,000 plus limits on bombers and air-launched cruise missiles. Reductions are phased in gradually over ten years, starting in 1985; or, if the pace of modernization calls for more rapid cuts, reductions are imposed every time a new warhead is added to the inventory.

Soviet Modernization Plans Under START/Build-down. Considerable uncertainty exists as to Soviet modernization plans and how they would be affected by agreement to the Administration's proposal. What is clear, however, is that the Soviets have developed great momentum behind their force expansion programs, which seems likely to color both their negotiating posture and their reaction to a final agreement. Thus the first section of this chapter assumes that the Soviets continue a steady program of modernization.

For this analysis, CBO assumes that, with full modernization, the Soviets would deploy the following systems: 1/

- The MX-equivalent SS-X-24, probably deployed in fixed silos but possibly in a "mobile" mode (in a mobile mode, the missiles could, for example, be loaded on railroad cars and moved between firing locations on rail tracks);
- The SS-X-25, the rough equivalent of the U.S. small ICBM, most probably deployed in a mobile mode;
- Follow-on versions of the currently deployed SS-18 and SS-19 ICBMs;
- Continued deployment of the large Typhoon ballistic missile submarine, armed with the multiple-warhead SS-N-20 missile;
- Possible deployment of yet another submarine-launched ballistic missile, the so-called SS-NX-23, about which little is known at this time; 2/

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1. See Appendix C for detailed force structure assumptions.

2. See Organization of the Joint Chiefs of Staff, United States Military Posture FY 1985, p. 26.

- Deployment of the Blackjack strategic bomber--somewhat larger than the U.S. B-1B--armed with a long-range, air-launched cruise missile (ALCM) similar to the U.S. ALCM.

Each of these systems is in some phase of testing; most are likely to reach deployment in the mid-to-late 1980s. Different force-balance outcomes would occur depending on the timing and emphasis the Soviets placed on the various aspects of this plan, as a later section of the chapter discusses in more detail.

Force Imbalances Would Be Likely to Decrease

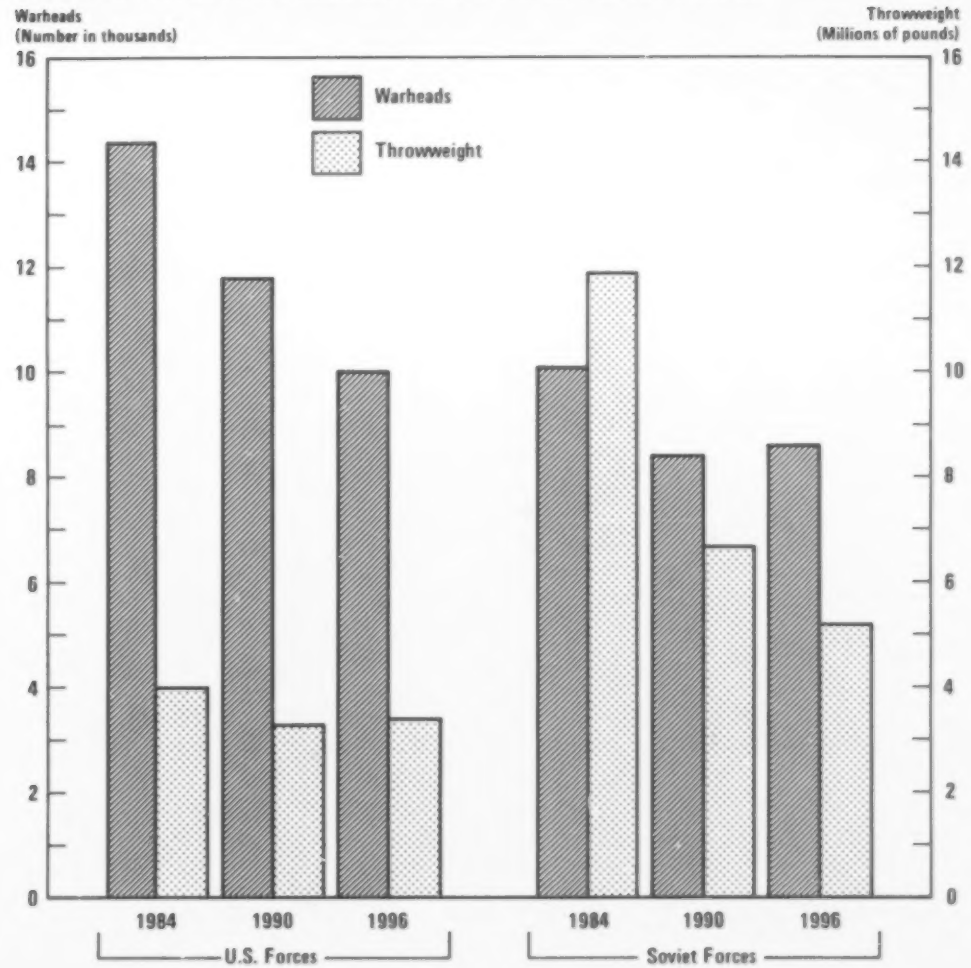
Under these key assumptions about START/Build-down and Soviet reactions, both countries would experience reductions in those measures in which they currently hold an advantage. Figure 3 shows how the total warhead counts and ballistic missile throwweight of both sides would appear in 1984, 1990, and 1996 if an agreement on START/Build-down was implemented in 1985. By arms control inventory counts the United States holds a lead in total warheads in 1984, while the Soviets clearly have the advantage in ballistic missile throwweight. By 1996, however, START/Build-down would impose a 30 percent decrease in U.S. warheads, together with a 15 percent drop in Soviet warhead counts. Conversely, a more modest 15 percent decrease in U.S. throwweight would be matched against a decline of 56 percent in Soviet ballistic missile throwweight compared with 1984 levels. Thus both gaps would narrow.

Figure 4 reflects this same phenomenon in a slightly different fashion. It shows that the U.S. advantage in warheads would diminish from 42 percent to about 16 percent. On the other hand, the Soviet superiority in missile throwweight would be expected to decline from 3:1 today to 1.5:1 by the mid-1990s. Thus, under START/Build-down each side would be likely to retain a numerical lead in its current area of strength, but because of the reductions process the imbalance would become smaller over time.

Relative Crisis Stability of Forces Would Improve

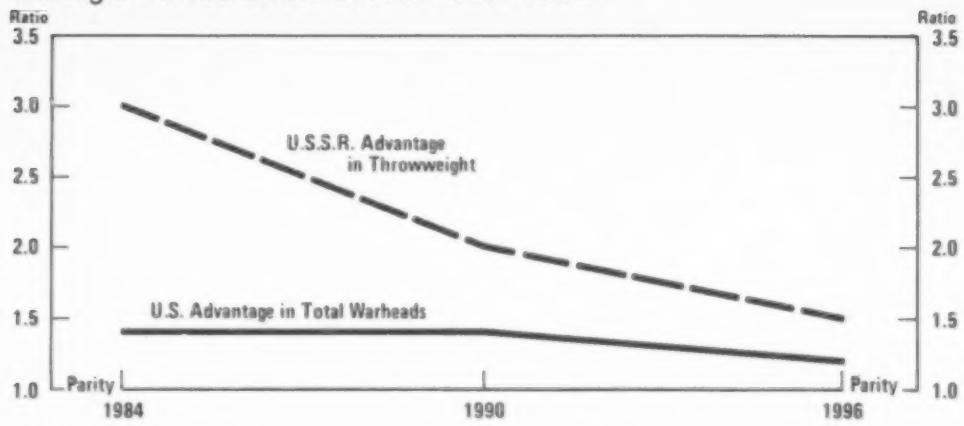
Just as was the case for the U.S. force the crisis stability of Soviet forces should improve under START/Build-down; that is, there would be a reduction in the pressure to use vulnerable weapons in a crisis rather than risk losing them. This would occur because the numbers of the most threatening, hard-target warheads in the Soviet arsenal based on ICBMs in fixed, increasingly vulnerable locations could decrease by over 60 percent. Fewer than 200 silos, containing 2,000 warheads of this kind, would be left

Figure 3.
Effect of START/Build-down on U.S. and Soviet Forces



by 1996. The Soviets currently have nearly 85 percent of their hard-target warheads based on fixed ICBMs, and this fraction could decline to less than 35 percent by 1996 under START/Build-down. Stated conversely, the percentage of hard-target warheads a Soviet planner could expect to survive a first strike would increase significantly. Thus, the relative value of the vulnerable assets--and the sense of urgency to use them before they could

Figure 4.
Comparative Advantages of U.S. and Soviet Strategic Forces Under START/Build-down



be destroyed in a nuclear war--could be decreasing, even in the face of improving U.S. hard-target capability.

Crisis stability should also improve when measured in terms of so-called "prompt" hard-target warheads. These are the subset of hard-target warheads on missiles that can reach their targets in a matter of minutes rather than the hours required by bombers and by cruise missiles carried on bombers. Prompt warheads are the forces most capable of a first strike during a crisis. Both sides currently have all such prompt, hard-target capability in their fixed ICBM forces. Under START/Build-down this situation would shift dramatically for U.S. forces by the mid-1990s, with less than 15 percent of such capability remaining in fixed, vulnerable ICBMs. For the Soviets, however, the shift would be small, with about 80 percent of prompt hard-target capability remaining in fixed ICBMs even by the mid-1990s--assuming that the MX-type SS-X-24 was deployed in a fixed mode. Additional Soviet deployments of mobile ICBMs beyond those assumed here, or the addition of sea-based hard-target capability, would improve this situation under a 5,000 warhead limit.

Because it currently includes no direct proposals to limit qualitative missile improvements, START/Build-down probably would not prevent the forces of both sides from becoming more accurate and lethal to fixed targets. With decreasing numbers of these targets, it would be easier for either side to target successfully its opponent's fixed ICBMs. Some critics

TABLE 1. AVERAGE AGE OF U.S. AND SOVIET STRATEGIC FORCES UNDER THE ADMINISTRATION'S START/BUILD-DOWN PROPOSAL AT END OF FISCAL YEAR a/

	1984	1990	1996
United States			
Land-Based Missiles	14	11	4
Bombers	23	22	15
Submarines	7	10	6
Soviet Union b/			
Land-Based Missiles	7	8	10
Bombers	18	5	7
Submarines	5	7	12

a. Average age is weighted by numbers of delivery systems and warheads per system.
b. Assumes no further modernization beyond that assumed in the text.

argue that this increasing vulnerability could degrade crisis stability. But others note that, because many of these ICBMs are vulnerable today, their declining relative value by the measures noted above would lessen pressures to launch them in a crisis in spite of their greater future vulnerability. Thus, under START/Build-down they would become more vulnerable but less valuable.

Average Age of the Forces Would Differ Over Time

Under START/Build-down, the relative age--and hence by one measure the relative modernization and technological sophistication--of U.S. and Soviet forces could change. Table 1 shows that, while Soviet forces would continue to be younger and hence more modern than their U.S. counterparts through about 1990, U.S. programs would reverse the situation--with the exception of the bomber force--by the mid-1990s.

The reversal in relative age of U.S. and Soviet forces between 1990 and 1996 would reflect the timing of modernization by the two countries.

Much of the assumed Soviet modernization would occur between now and the end of the decade. The U.S. plan, however, is to modernize in two stages, in the 1980s with the MX and B-1B, and again in the 1990s with the Advanced Technology Bomber, small ICBM, and Trident II missile. This second tier of modernization, plus continued retirements, would maintain the trend toward newer U.S. forces in the 1990s and could give the United States an age advantage. To be sure, the Soviets could retain a relatively young force by developing and deploying new systems beyond those assumed in this chapter, thereby continuing to have a more modern force structure even in the mid-1990s. This, in fact, would be consistent with their previous patterns of force deployment and modernization.

How Changes Would Be Effected

As with the U.S. forces, the reduction to the 5,000-warhead limit would drive many of the changes in Soviet forces. The reduction to this limit would almost certainly cause a restructuring of Soviet forces away from the predominance of ICBMs, which now make up about 70 percent of all Soviet ballistic missile warheads. If the Soviets chose to minimize reductions in their ICBMs, they would have to decimate their ballistic missile submarine force. Movement away from the predominance of ICBMs, which carry large numbers of warheads, would bring about the drop in throw-weight, decreases in fixed hard-target warheads, and the resulting improvement in crisis stability noted above.

The guaranteed annual reductions feature provides a predictable regimen for moving toward the plateau level of 5,000 warheads. The Soviets could not--nor, for that matter, could the United States--take advantage of ongoing or nearly ready weapons programs to build up their forces quickly and reduce them to the plateau level only when the final date for doing so was at hand.

While the guaranteed annual reductions--and not the build-down ratios--provide the binding constraint given the assumed pace of Soviet modernization, the build-down ratios minimize the risk that the Soviets would choose substantially different plans from those assumed in this chapter and deploy new systems that would harm crisis stability. 3/ The ratios would, for example, exact a heavy penalty in numbers of warheads should the Soviets choose to deploy a new, large missile--as the Soviets have often done in the past. Such a Soviet deployment--even if offset by retirements so as to live within the guaranteed annual reductions--would require extra

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3. As noted earlier, the ratio mechanism would buffer both further expansion of this plan and attempts to speed it up.

retirements because two old warheads must be retired for every new warhead deployed on a multiple-warhead ICBM. Discouraging deployments of large ICBMs in fixed and hence increasingly vulnerable locations may be desirable since, in a crisis, these would increase the pressure to use the vulnerable but powerful weapons rather than risk losing them.

TWO OTHER POSSIBLE SOVIET REACTIONS TO START/BUILD-DOWN

The Soviets could, of course, adopt other modernization plans, or modify their plans if they agreed to the Administration's arms control proposal. They might, for example, try to attain some particular advantage by altering the timing or scope of the broad-based effort assumed in the earlier analysis. Then again, they might find it difficult to stop or slow certain weapons design or production programs after they had acquired momentum.

To explore the possible effects of such changes, CBO examined not one but three potential approaches the Soviets might take, assuming they were to agree to the Administration's START/Build-down proposal:

- The **"full modernization"** strategy assumed above, which involves the introduction of many new systems through the early 1990s. This case could be characterized as the most technologically threatening of the three to the United States.

- A second approach of **"delayed modernization"** in an effort to avoid the effects of START/Build-down and retain advantages in certain measures of strategic capability over U.S. forces. This strategy would combine a near-term numerical threat with the technological threat noted above, although the latter threat would be deferred.

- A third **"maximum ICBM"** plan designed to maintain the predominance of the Soviet land-based missile force in their overall force structure, in particular their large throwweight, hard-target systems. This assumes further the Soviets would be willing to forgo, if necessary, a strategic submarine force of much consequence in order to achieve this goal. It might be characterized as the most "Soviet" of the three approaches in that it would continue the past heavy reliance on ICBMs.

Analysis of these three approaches suggests that delayed modernization, the second of the three, would not be particularly attractive to the Soviets. Maintaining their ICBM force, the third approach, would be consis-

tent with their historical emphasis and could yield results different in some dimensions from those presented above that were based on the full-modernization approach.

START/Build-down Provides Little Incentive for Soviets to Delay Modernization

Under the terms of START/Build-down, the Soviets would probably not want to delay or alter their assumed modernization plans significantly. This is because the operative mechanism for reducing the Soviet ballistic missile arsenal appears to be the guaranteed annual reductions of about 5 percent in ballistic missile warheads, rather than the build-down ratios. Delaying modernization would not allow the Soviets more warheads. Nor would it help much for the Soviets to delay modernizing their bomber force with new aircraft and cruise missiles. Under the limits assumed in this study, that delay would not allow them more warheads either.

The Soviets could achieve a short-term advantage in ballistic missile throwweight by delaying the introduction of newer, lighter missiles in favor of retaining existing, heavier ICBMs. 4/ Figure 5 shows that through the rest of the decade this strategy would give them about 19 percent more throwweight than they might have under a full-modernization approach, but the difference would eventually disappear as they deployed newer missiles. Additionally, a delayed-modernization plan would force up the average age of the Soviet ICBM force by about five years through the late 1980s. This temporary throwweight advantage might not be sufficiently attractive to cause the Soviets to adopt this strategy.

Soviets Could Retain More ICBM Warheads and Throwweight

Maintaining their ICBM force, the third approach listed above, might be more attractive to the Soviets. This strategy would provide them more throwweight, both in the short and long term, plus more hard-target capability. Such an approach would rely on maintaining substantial numbers of today's fourth-generation ICBMs along with continued modernization using newer land-based missiles.

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4. Also, they might conceivably conclude that by waiting to deploy newer systems--like the SS-X-24--they could then field better ones. This has not been their style in the past, however.

Figure 5.

Effect of START/Build-down on Soviet Warheads and Throwweight by 1990 Under Three Assumed Modernization Approaches

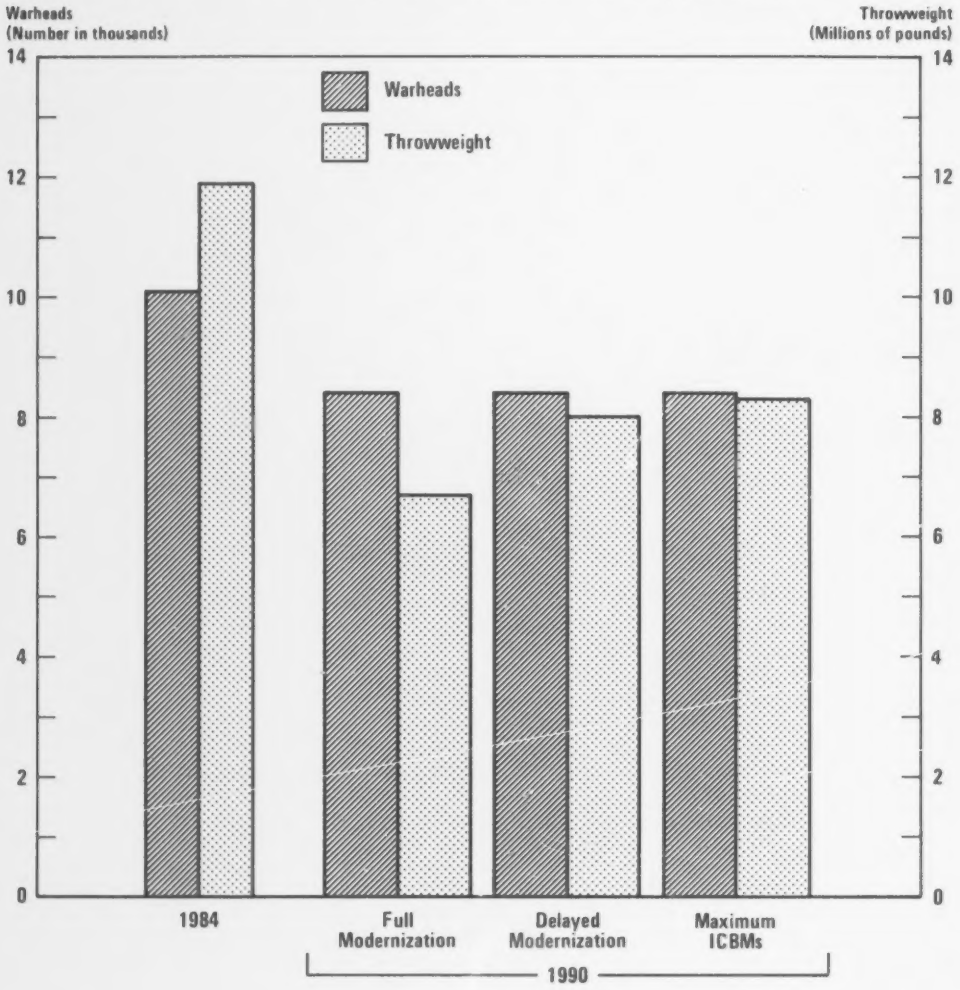

Figure 5 shows that a short-term throwweight advantage of about 24 percent over the fully modernized force would obtain from this strategy. (By the mid-1990s the advantage would grow to just over 30 percent, with the Soviets retaining twice as much throwweight in their force as the United States in its.) Figure 6 shows that the Soviets would also have about 17 percent more hard-target capability by 1996 under this plan as compared to the full-modernization plan, with a substantially greater fraction of this hard-target capability (46 percent as against 34 percent) on fixed ICBMs.

Such an approach might appeal to the Soviets because it would maintain their current emphasis on ICBMs. They might view the additional throwweight--with its potential for increasing explosive power--as an advantage in countering possible U.S. development of a mobile ICBM that could be deployed over a large area. Barraging the area--which would require large amounts of destructive power--would probably be the most effective plan for attacking such a mobile ICBM.

The price to be paid for this approach, however, would be threefold. First, the Soviet ICBM force would become increasingly older and less technologically up-to-date as the old ICBMs were kept. Next, much more of it would be based in fixed silos, which are becoming increasingly vulnerable to improving U.S. hard-target capability. This would do little to improve crisis stability. Finally, there would have to be a large reduction in Soviet sea-based strategic forces to accommodate a larger ICBM force, even though sea-based forces are generally thought to be less vulnerable to enemy attack. The sea-based force would carry only about one-fifth of the total Soviet warheads under this scheme rather than expanding to carry about one-third of them as under the two alternative approaches. 5/

Choice of this approach would be consistent with past Soviet behavior, despite the limitations of continued emphasis on ICBMs. But the fundamental conclusions noted above would not change if the Soviets adopted this approach. There would still be substantial changes in their force structure. Soviet ICBMs currently carry 64 percent of total warheads, but they would eventually carry about 40 percent even if they chose to continue emphasis on their current types of land-based missiles (as against 28 percent if they chose full modernization of their ICBM force). Under START/Build-down, continued emphasis on ICBMs would also mean less throwweight and improved crisis stability relative to today, which was the basic conclusion reached in the discussion of full modernization above.

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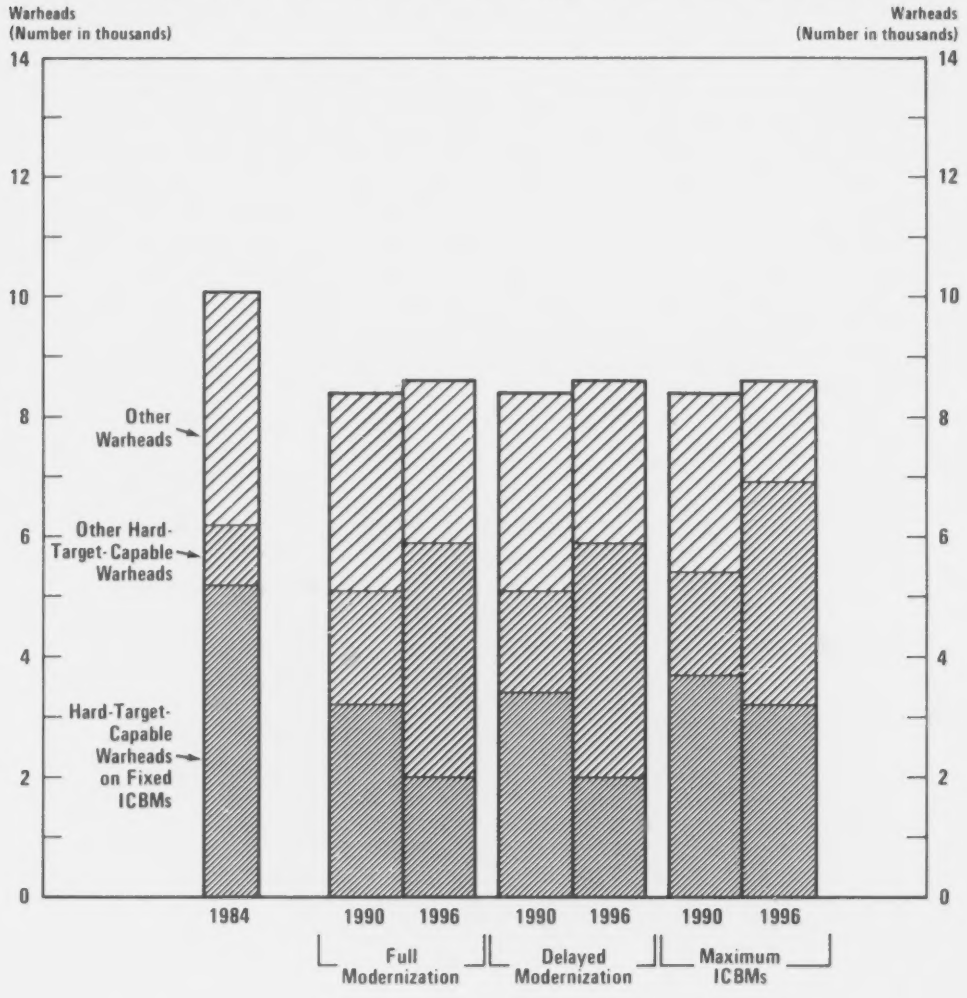
5. The Soviet SSBN force currently carries about 26 percent of total strategic warhead inventories.

Figure 6.

Effect of START/Build-down on Composition of Soviet Strategic Forces Under Three Assumed Modernization Approaches: 1990 and 1996



Crisis stability might also be enhanced, even with emphasis on ICBMs, by other factors. Even with continued emphasis on ICBMs, a declining share of Soviet ballistic missiles would likely be in fixed sites and hence a smaller share would be vulnerable as U.S. hard-target capabilities improved. Perhaps of more importance, a strategy of emphasis on ICBMs could actually prompt the Soviets to deploy more mobile missiles, like the smaller SS-X-25 or the larger MIRVed SS-X-24, in a rail-mobile or multiple-shelter scheme. Mobile missiles are more difficult to destroy and so enhance crisis stability.

SENSITIVITY OF RESULTS TO CHANGES IN THE ADMINISTRATION PROPOSAL

Changes in the Administration's START/Build-down proposal--originating either from within the U.S. government or through the negotiating process--would alter some of the results discussed above. CBO examined the effects of two changes: increasing the ballistic missile warhead plateau level to 7,000, or changing to a stricter, wider-ranging set of build-down ratios.

Effects of Increasing the Warhead Plateau

Because it would cut so deeply into the Soviet ICBM force, the 5,000-ballistic-missile-warhead plateau called for in START/Build-down may be particularly difficult to negotiate. In an earlier START negotiation, the Soviets reportedly introduced an approach that would have allowed each side to retain around 9,000 to 10,000 ballistic missile warheads, nearly double the U.S.-proposed level. 6/ To test the effect of an agreement somewhere between the two positions, CBO examined a 7,000-warhead plateau--approximately midway between the two proposals--with all the other assumptions noted above held constant. 7/

In both absolute and relative terms, an agreement at the 7,000-warhead level would do less to equalize the forces of the two sides than would

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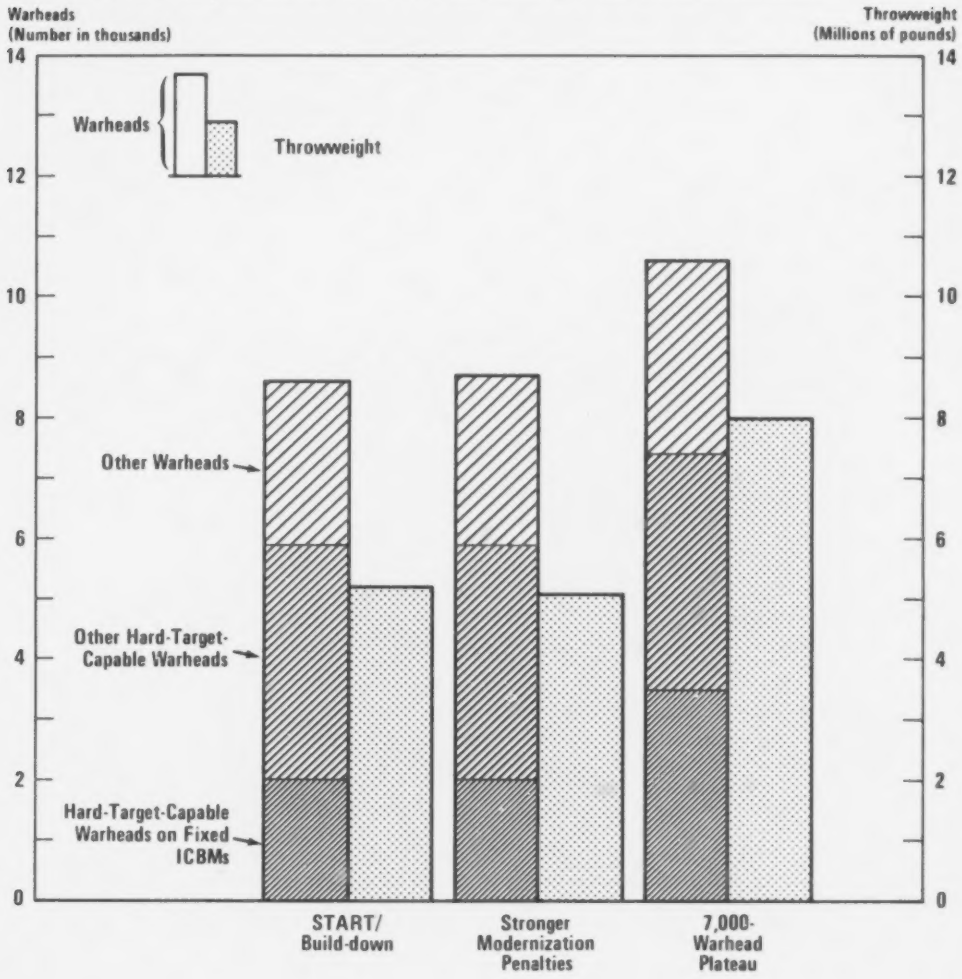
6. The Soviet proposal reportedly called for reductions of between 10 and 20 percent in the numerical limits set by SALT II, plus a Soviet offer to agree to equal total warhead levels--that is, including bomber-delivered weapons. The figure cited in the text is computed using SALT II counting rules.

7. Note that the guaranteed annual percentage for reductions in this case would be about 3 percent.

Figure 7.

Soviet Strategic Forces Under START/Build-down and Alternative Proposals in 1996, Assuming Full Modernization



one at the 5,000-warhead level. Because both sides could accomplish their apparent modernization goals under the terms of the Administration's current proposal, both would seem likely to reach the 7,000-warhead level primarily by retaining existing systems longer. This would be especially true of ICBM forces on both sides--which would end up being substantially older, on average, than under the Administration's plan. Such an approach would reduce U.S. savings under START/Build-down to $22.3 billion, some $6.5 billion less than for the 5,000-warhead plateau. This is mainly because the United States would retain more systems longer. Savings would be still lower if the United States were to choose expanded missile procurement to reach the higher plateau.

This higher warhead plateau would also give the Soviets an opportunity to retain much more throwweight by keeping more--and, perhaps, all--of their heaviest ICBMs. In fact, the additional throwweight that the Soviets could retain would be disproportionate to the additional number of warheads allowed under the higher plateau. As Figure 7 shows, in the long run the shift from a 5,000- to a 7,000-warhead plateau--an increase of 40 percent--would allow the Soviets to keep 54 percent more throwweight than under START/Build-down. This 54 percent increase in throwweight could give the Soviets a higher probability of successfully attacking a mobile force of U.S. small ICBMs or adding devices to help penetrate any future U.S. strategic defenses. Figure 8 shows that the higher warhead plateau would also allow the Soviets more throwweight in the short run, although not as great a difference. For these reasons, a "double build-down" incorporating some measure of ballistic missile throwweight in addition to a measure of warheads might be of more interest at higher warhead plateau levels (see Appendix B for a discussion of this).

The higher warhead plateau might also mean less of an improvement in crisis stability. Figure 7, for example, shows that the Soviets might retain 75 percent more hard-target capability in fixed silos under this plan than at the 5,000-warhead level. In an absolute sense this would represent nearly 50 percent of their hard-target capability as opposed to around 35 percent at a 5,000-warhead plateau, and would be closer to today's situation.

Effects of Stronger Penalties on Modernization

The Start/Build-down proposals call for retirement of old warheads as new ones are deployed. Two warheads must be retired for each new multiple-warhead ICBM warhead, three for every two new multiple-warhead SLBM warheads, and one for each new single-warhead ballistic missile.

Figure 8.

Soviet Throwweight Under START/Build-down and Alternative Proposals in 1990 and 1996, Assuming Full Modernization

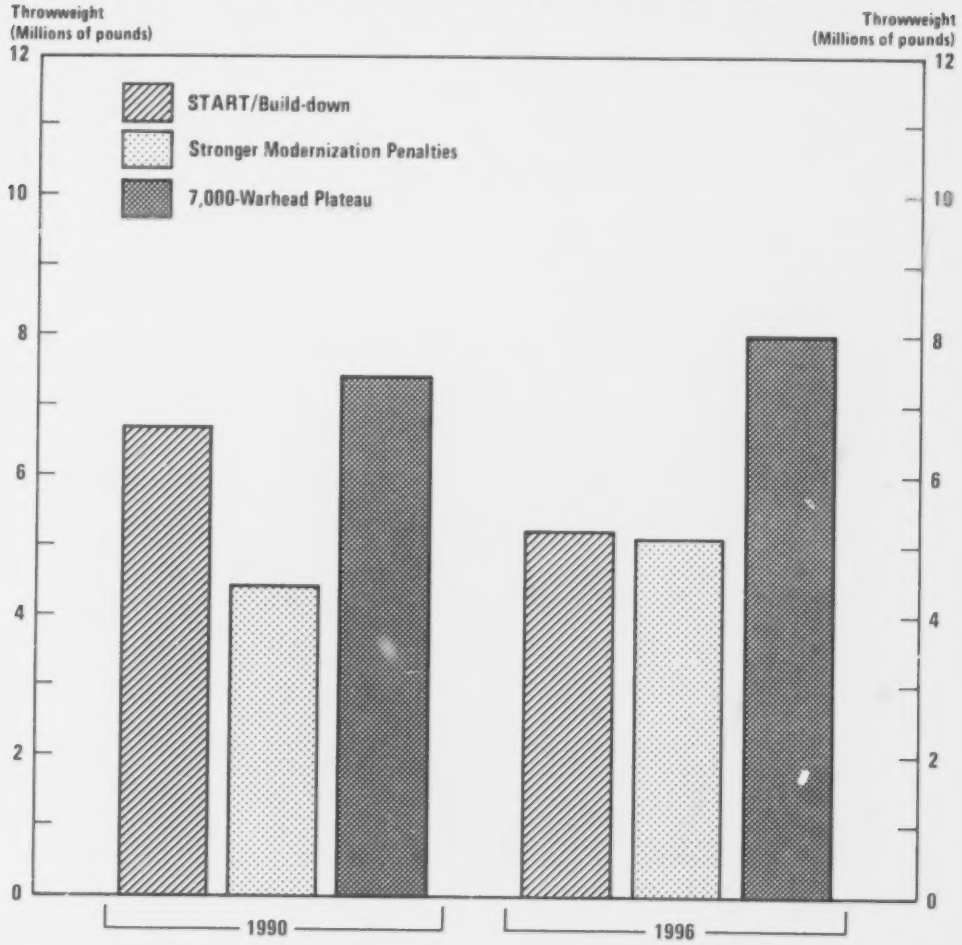
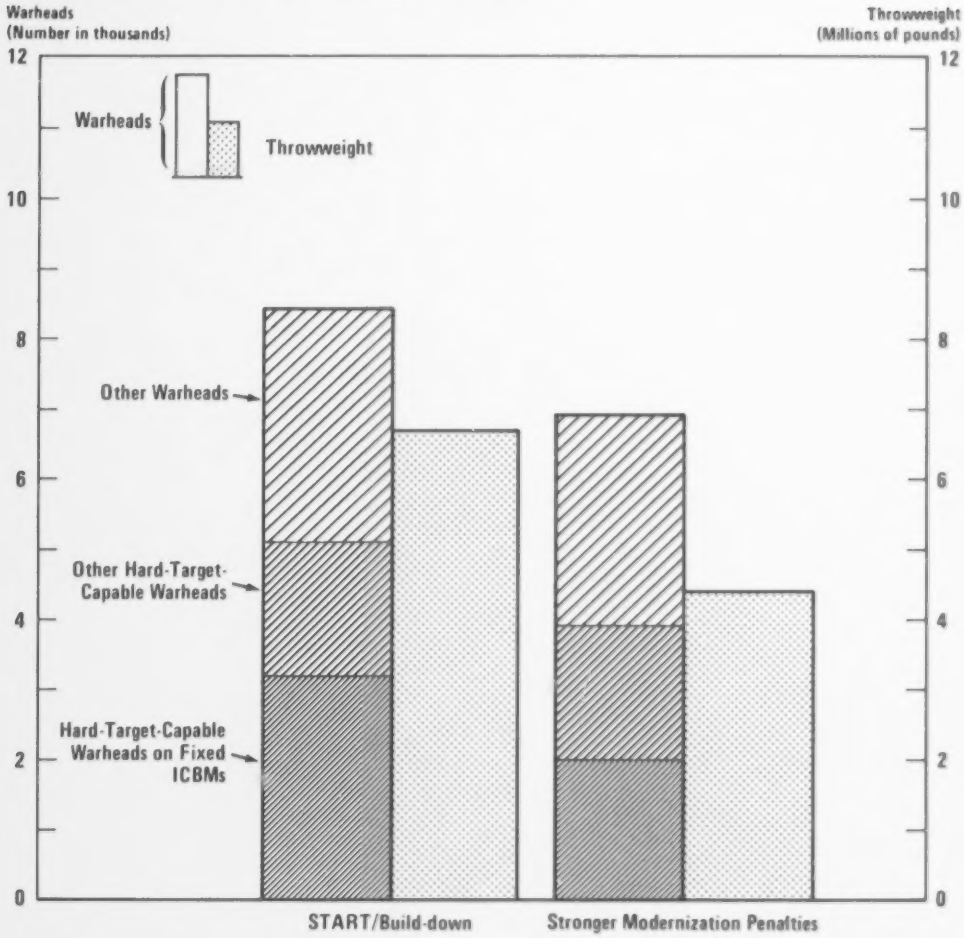


Figure 9.

Effect on Soviet Forces in 1990 of Moving Ahead with Modernization Despite Stronger Penalties



Earlier in the debate on the build-down concept some of its supporters called both for higher penalties for deploying multiple-warhead ballistic missiles and for the inclusion of bomber weapons in the build-down ratios. This latter idea would have explicitly allowed the trade-off of bomber and missile warheads. To test the effects of these ideas, CBO assumed a three-for-one build-down ratio for all MIRVed ballistic missiles, a three-for-two ratio for single-warhead ballistic missiles, and a two-for-one ratio for bomber weapons; a 5,000-ballistic-missile-warhead plateau, with guaranteed annual reductions; and freedom-to-mix between missile and bomber warheads to satisfy the build-down constraints.

Unlike the START/Build-down proposal, which permits both sides to pursue their assumed modernization plans fully without great penalty, the stricter build-down proposal would likely provide a strong impetus for both sides to slow the timing and/or alter the scope of their modernization programs. This is because the build-down ratios based on modernization often require reductions larger than the annual percentage reduction. For the Soviets, the assumed expansion of their bomber force well beyond its current size, plus an apparent continued interest in multiple-warhead ICBMs, would necessitate significant cuts in existing forces--and overall measures of capability--to support all the modernization and still live within the stricter build-down ratios. Figure 9 shows that substantial cuts in Soviet forces would occur in the near term if they were to choose a full-modernization approach in this case. Nearly all of these drawbacks could be avoided by choosing a delayed modernization approach as outlined earlier.

A similar situation would hold for U.S. forces in the near term. For the United States to accommodate the stricter build-down it would have to delay modernization or alter its structure, along with earlier retirements of existing forces. For example, cancelling the MX missile--which is heavily penalized under the stricter ratios--together with still earlier retirements of Poseidon submarines, would help to save much of the remaining modernization effort. Savings could amount to $8.7 billion more than estimated under the Administration's START/Build-down proposal. Slowing MX deployment and limiting deployment to 50 missiles would also necessitate a significant stretch-out of the B-1B program, plus further premature submarine retirement; while full MX deployment would necessitate even more drastic offsets in both existing forces and planned modernization.

For both arms control and budgetary reasons, the Congress may wish to consider changes in the strategic modernization plan such as altering MX procurement. Some of these potential changes are the subject of the next chapter.

CHAPTER IV. COMPARISON OF THE ADMINISTRATION'S MODERNIZATION PLAN AND ALTERNATIVES

The Administration's strategic modernization plan represents a buildup exceeding that experienced in this country in the past 20 years. Over the next five years, it would spend about $290 billion in budget authority for procurement and operation of strategic systems out of total planned defense spending of about $1,700 billion.

Arms control may have significant bearing upon the modernization program since the Administration is proposing major reductions in the nuclear weapons inventories of both the United States and the Soviet Union. While the Congress has no direct role in arms control negotiations, it exerts influence by approving or altering the modernization plans put forth by the Administration. Because the Congress will no doubt also continue to be interested in defense options that reduce federal spending, this chapter focuses on the effects of alternative programs on strategic force costs and capabilities. 1/

This chapter first briefly reviews the Administration's plan for modernizing U.S. strategic forces and then discusses alternative approaches to that plan, including terminating procurement of the MX missile, procuring the MX at a slower rate, and altering the bomber program. The chapter assesses the effects of these changes on strategic capabilities, costs, and their compatibility with arms control.

SUMMARY OF THE ADMINISTRATION'S PROGRAM

The Administration's plan--outlined in detail in Chapter II--is far reaching, both in breadth and in time. In the absence of a new arms control agreement it would, within the next decade and a half:

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1. The federal deficit is estimated at about $197 billion in 1985. Under current tax and spending policies, the deficit could reach $308 billion in 1989. For details, see Congressional Budget Office, An Analysis of the President's Budgetary Proposals for Fiscal Year 1985 (February 1984). This estimate includes 5 percent annual real increases in defense budget authority.

- Deploy 100 large, hard-target-capable MX missiles;
- Deploy a yet undetermined number of new ICBMs--a small ICBM (SICBM) and/or more MX missiles;
- Field two new bombers and about 3,000 air-launched cruise missiles;
- Build and deploy about 20 Trident submarines armed with a new missile that would, for the first time, bring to the sea-based forces the capability to destroy targets hardened against nuclear blasts.

This modernization program would greatly increase U.S. strategic capability. Total warheads--measured in terms of arms control inventories--would increase 15 percent by 1996, while warheads able to destroy hardened targets would increase over 140 percent (see Chapter II for details). There would also be substantial increases in operational inventories of weapons. 2/ By the 1990s, many of the U.S. operational forces would also be substantially more modern than today's forces. However, the retention of older systems generally would keep up the average age of the forces.

This buildup and modernization of U.S. strategic forces would parallel actions taken by the Soviet Union over the last decade. During that period, the Soviets more than quadrupled the number of operational nuclear warheads in their inventory, with most being carried on launchers less than ten years old. And, as Chapter III noted, the Soviets apparently have under way an aggressive plan to continue that modernization.

Costs

CBO estimates that it would cost about $60 billion in budget authority in 1985--and a total of about $290 billion over the next five years --to build, modify, operate, and support all of the strategic forces in the Administration's plan. The estimates include investment and operating costs directly associated with strategic forces, as well as an allocation of indirect costs such as intelligence and communications, logistics, base operating sup-

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2. For counts of operational inventories, see Congressional Budget Office, Modernizing U.S. Strategic Offensive Forces: The Administration's Program and Alternatives (May 1983).

port, and personnel support. 3/ (These approximations are based on estimates made last year, since details of direct and indirect costs beyond 1984 are not yet available for the Administration's latest five-year defense plan. The costs should, however, provide a rough guide to likely totals under the latest program.)

Between 1985 and 1989, strategic costs should decline modestly in real terms (that is, after adjustment for inflation). This reflects the timing of two major strategic programs, the B-1B bomber and the MX missile, whose procurement would end in 1986 and 1989, respectively.

Beyond 1989, strategic investment costs could increase again as the Advanced Technology Bomber, Trident II missile, and small ICBM all entered production. The President's Strategic Defense Initiative for defense against ballistic missiles could also push up investment costs. Operating costs would increase during the late 1980s and early 1990s as new forces were added and only a few older systems were retired. Later, when many currently deployed systems were retired, operating costs would decrease.

The dollars to be spent on strategic forces represent a relatively small part of the total defense budget, about 19 percent in 1985. Possible cuts in the program would, however, represent a significant part of the reductions that some critics believe should be made in defense spending. Hence costs would be a major part of the rationale for altering the strategic program.

ALTERNATIVE ONE: TERMINATE THE MX MISSILE PROGRAM

On April 19, 1983, the President announced his endorsement of the recommendations of the Scowcroft Commission regarding the modernization of land-based intercontinental ballistic missiles. Part of the Scowcroft program recommendation called for immediate ICBM modernization through the deployment of 100 MX missiles in existing Minuteman silos.

The Congress approved the program as part of a package recommendation for ICBM modernization that included the design and development of a small, single-warhead ICBM (SICBM) suitable for mobile deployment, and continuing development of basing concepts for both missiles. Procurement of the MX was limited by the Congress to 21 operational missiles from 1984 funds, and strict language was provided in the appropriations bill to link its continued deployment to the development of the small ICBM. The linkage

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3. Administration figures are lower since they do not include as comprehensive a total for indirect support costs.

reflected concern over deploying the MX in existing silos. Indeed, before the Scowcroft Commission report, the Congress had considered and rejected limited deployment of the MX in existing silos out of concern for its vulnerability to a first strike, and the destabilizing effect such vulnerability might have in time of crisis.

The alternative described here would again reject the deployment of MX missiles, but would retain the rest of the Administration's strategic program--including deployment of a follow-on land-based missile intended to preserve the triad of strategic forces. The remainder of this section states the case for and against this approach.

The Case for Deploying the MX

The MX Could Foster an Arms Control Agreement. The Scowcroft Commission stated that deploying the MX in Minuteman silos would be an important step toward achieving the long-term goal of a land-based missile force that would be able to survive a Soviet attack and hence be more stable in a crisis. The MX itself would not necessarily survive a first strike; given the growing power and accuracy of Soviet weapons, only a "mobile" missile that can shuttle from place to place offers a high chance of surviving a Soviet attack, especially in the 1990s. One contribution of the MX would be to give the Soviets an incentive to conclude an arms control agreement. Only with such an agreement could the United States be confident that the Soviets would not deploy enough weapons to overwhelm any reasonably sized missile force, even one that was mobile.

According to the Scowcroft Commission, the MX would be able to destroy even the hardest military targets--most notably, ICBM silos and command and control facilities--a capability currently held by much of the Soviet ICBM force. The Commission argued that this would give the Soviets a strong incentive to conclude an agreement that would have a stabilizing effect on the nuclear balance.

The MX Could Contribute to U.S. Capability. In addition to fostering an arms control agreement, the MX might itself contribute to the number of U.S. warheads able to survive a Soviet first strike, at least for a few years. While Soviet nuclear weapons are currently thought able to destroy the Minuteman silos that would house the MX, the Scowcroft Commission argued that the existence of ICBM and bomber forces contributes to the survivability of both forces. With their current capabilities, the Soviets could not attack the ICBM force and the bomber force simultaneously, and the system not attacked first would have sufficient warning to escape and retaliate.

Even if the Soviets increased their capabilities to attack both the ICBM and bomber forces simultaneously, the MX might still be a deterrent. Reportedly, the United States already has the capability to launch its Minuteman missiles before Soviet weapons detonate on American soil. 4/ Since U.S. nuclear weapons policy neither assumes nor precludes such a "launch on warning" or "launch under attack," the possibility that the United States might adopt such a strategy with the MX could add uncertainty to Soviet decisions and hence contribute to deterrence.

The MX Could Make Other Contributions. Deploying a substantial number of MX missiles in silos would also open an ICBM production line so that production could be expanded later should conditions dictate. Examples of situations that could create a demand for more MX missiles include: lack of success in developing or deploying a small ICBM; a rapid buildup in Soviet antiballistic missile (ABM) capability; or failure to reach an acceptable arms control agreement.

Those who favor deploying the MX in silos also point to certain desirable attributes of a land-based missile force. Land-based missiles have long been thought to offer the most reliable command and control, as well as having high alert rates. They also, with their fixed locations, offer the most accurate warheads, although the new Trident II (D-5) missile in Trident submarines should approach the accuracy of the MX. Finally, land-based missiles provide targeting flexibility. With their reliable and rapid communications, they can be retargeted very quickly to reflect changes in the U.S. battle plan.

Proponents also see the MX as a signal of American determination to maintain a nuclear stance. It has been 14 years since the United States last introduced a new land-based ICBM. During that period the Soviets have introduced an entirely new generation of ICBMs, and are apparently testing two more of yet another generation. Deploying the MX may be necessary as a means of convincing the Soviets that the United States is serious about maintaining a strong land-based force.

The Case Against the MX

The MX Would Make Only a Modest Contribution to Capabilities. Nuclear capabilities are traditionally measured by the numbers of warheads

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4. See U.S. House of Representatives, Appropriations Committee, Department of Defense Appropriations for 1983, 97:2, Part 1, pp. 340-341.

able to survive a Soviet first strike and then retaliate. This is thought to provide the best measure of deterrence, on the assumption that a president might not launch U.S. forces before actual nuclear explosions confirmed a Soviet attack. In terms of surviving hard-target warheads the MX would contribute between 3 percent and 5 percent of all U.S. capability in 1990 and 1 percent or less by 1996. 5/ The higher contribution would be in the event of a surprise Soviet attack, the type thought least likely by many analysts. The MX would contribute most in the event of such an attack because ICBMs are almost always on "alert" and ready to be launched, whereas many submarines and bombers would have been destroyed in their ports or airfields. After an attack preceded by warning, which is thought to be the most likely scenario, the contribution of the MX would be low because a Soviet first strike could--in theory, at least--have destroyed almost all MX missiles housed in Minuteman silos, while alerted bombers and submarines would have been dispersed to safety.

These calculations ignore the argument advanced by the Scowcroft Commission that, with their present capabilities, the Soviets could not attack U.S. ICBM and bomber forces simultaneously. If they attempted to do so by delaying missile launches from nearby submarines targeted against U.S. bomber bases until Soviet ICBM warheads--with their longer flight times--could arrive at U.S. ICBM silos, then a high proportion of the U.S. bomber force on alert would escape before its bases were struck. If, on the other hand, the Soviets launched their attacking missiles simultaneously, then the submarine-launched missiles would be detonating on U.S. bomber bases well before the ICBM warheads arrived on target. The U.S. could then launch its ICBMs after confirmation of a Soviet attack but before absorbing the strike. Critics argue that the Soviets would be much more likely to choose the former course, which would enable them to destroy the MX and Minuteman missiles and then await retaliation by slower, less accurate bombers that would face Soviet air defenses.

The MX May Not Foster Arms Control. Since it would add only modestly to surviving U.S. warheads, critics argue that the MX might provide the Soviets little incentive to reach an arms control agreement. The MX would contribute substantially to U.S. capability, and hence perhaps to U.S. bargaining leverage, only if the Soviets believed that the United States

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5. See CBO, Modernizing U.S. Strategic Forces, p. 44. The percentages are based upon operational inventories, which are the subset of arms control inventories for use by a military planner. See pp. 45-48 for a discussion of the MX contribution under other scenarios and to increasing prompt hard-target capability, which in most cases is still modest.

would launch the MX missiles rather than risk their destruction by a first strike--a point the United States has not clarified. Moreover, the United States will have under way a substantial modernization program that will mean new systems in all legs of the strategic triad. The Soviets may find U.S. plans to deploy several thousand hard-target warheads on Trident submarines much more reason to try to negotiate constraints than the deployment of 100 vulnerable MX missiles.

The MX May Be Destabilizing. There is also fear that deployment of the potent MX in a nonsurvivable basing mode would be destabilizing precisely because the Soviets could not be sure, in a crisis, that the United States was not about to launch a preemptive strike with this large, accurate missile. If they also believed that they could destroy the MX missiles in a first strike, they might be tempted to launch quickly even though it would mean precipitating a nuclear war. 6/ From this point of view, it is difficult to justify MX deployment as consonant with the security and stability goals of START/Build-down.

Other Arguments Against the MX. The MX is not needed to enable the United States to retain some of the advantages of a triad of forces through the early 1990s, when the small ICBM should be deployed. Without MX, there would still be 1,000 Minuteman missiles--300 of which currently have some hard-target capability. These could be retained at least through the end of the century. 7/ While Minuteman missiles would be no more survivable than MX missiles in the same silos, the Soviets would still have to target them in a first strike. Indeed, if, as the Scowcroft Commission stated, it is enough to rely on the mutually reinforcing survivability of ICBMs and bombers in the near term, then terminating the MX would not mean forgoing all the advantages inherent in the triad. The Minuteman force would continue to provide assured command and control, high alert rates, and other desired attributes of a land-based missile force.

Terminating MX Would Be Consistent with START/Build-down

Terminating the MX program would be consistent with the philosophy underlying much of the START/Build-down proposal. That proposal--at least

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6. On the other hand, if the Soviets believed that the number of MX warheads was insufficient to present a credible first-strike threat, this concern could be diminished.

7. See U.S. Senate, Armed Services Committee, DoD Authorization for Appropriations for Fiscal Year 1983, 97:2, Part 7, p. 4591.

the ballistic missile build-down portion--is structured to create a disincentive for the continued deployment of powerful strategic systems in fixed and vulnerable silos, since such deployments could cause an enemy to attack first in a crisis. The MX system would have many of these characteristics.

If START/Build-down were in effect, terminating the MX would also allow the United States to add more of other kinds of warheads or retain until 1996--when the force of small ICBMs will be deployed--1,000 warheads currently in the arsenal, such as Minuteman missiles. After 1996, when all but 200 MX warheads would be retired to accommodate a force of 1,000 small ICBMs, forgoing MX would allow either the retention of 200 older warheads or the procurement of 200 new warheads--as on 200 additional small missiles or on one additional Trident submarine.

Cost Savings

Terminating the MX program would mean retaining the 21 MX missiles already bought, perhaps for use as space boosters. No further funds would be spent on research or production of the MX missile or on finding a way to base it.

Such an alternative would offer substantial savings over the next five years and beyond. In terms of budget authority, cancellation of the MX system could save approximately $14 billion over the next five years. There would be no significant change in operating costs since the United States would continue to operate the Minuteman missiles scheduled to be replaced by the MX.

ALTERNATIVE TWO: SLOW THE MX MISSILE PROGRAM

This alternative would slow the scheduled MX procurement rate to 21 missiles per year, the amount the Congress approved for 1984. The program could be terminated altogether upon successful completion of a U.S./Soviet arms control accord.

Under this alternative, the Congress would not curtail the scope of the modernization program in the absence of bilateral constraints on the arms buildup, but neither would it commit itself as quickly and as fully to a weapons system conceived mainly as offering the Soviets an incentive to reach an arms accord. This may also be more consistent with the time needed to reach an arms control agreement. Although the Administration has expressed optimism with regard to reaching an early arms control accord, past history and the current negotiating situation suggest otherwise.

It took seven years, for example, for negotiations to reach agreement on the proposed SALT II treaty. At this slower rate, however, the full complement of 100 deployable missiles would not be procured until 1994, rather than 1989 as under the current schedule. Full deployment would be delayed from 1990 to about 1995.

By slowing MX procurement, the Congress would not forgo the qualitative advantages of providing an incentive to the Soviets and opening an ICBM production line. It would still be adding more near-term prompt hard-target capability to counter Soviet strength, although the increment would be smaller. On the other hand, this course would hold open the opportunity to terminate the MX program for a longer time should the Soviets agree to START/Build-down.

The rest of the Administration program, including procurement of a force of small ICBMS, would remain intact under this alternative as under the previous one. Moreover, the Congress would have the option of expanding production of the MX if an agreement was not reached.

Effects of Slowing MX Procurement Under START/Build-down

If START/Build-down were in place, slowing the MX would enable the United States to retain existing warheads for a longer period. For example, if the original schedule called for the deployment of 40 MX (with 400 warheads) in a given year, and instead 21 were deployed (with 210 warheads), the United States could retain 190 existing warheads in addition to the 210 MX warheads.

Near-Term Savings

Costs of the MX would be delayed under this approach. Over the next five years, the Administration's approach would cost $14.4 billion in budget authority while this slower deployment would cost $10 billion, a savings of $4.4 billion.

Over the longer run, savings would occur only if the United States decided to terminate the MX program before buying enough MX to deploy 100 missiles, perhaps because an arms control agreement had been reached. If 100 missiles were ultimately deployed under this slower option, total costs would actually be greater than with the Administration's approach. Slow deployment would cost more because of the overhead in keeping the production line open for more years, the effects of inflation, and potentially inefficient production rates.

ALTERNATIVE THREE: ALTERING THE BOMBER PROGRAM

While changes in the land-based missile program seem among the most likely issues for Congressional debate over the next year, the Congress may also wish to consider altering the Administration's plan for strategic bomber force modernization. For example, it could slow production of the B-1B bomber or eliminate research and development for the Advanced Technology Bomber.

Slow Production of the B-1B

This alternative would be consistent with the spirit of allowing modernization to proceed, but at a slower pace, in hope of reaching an arms control agreement that may permit a reevaluation of the scope of modernization.

The current schedule for the B-1B calls for a large procurement in 1986, the last currently scheduled procurement year. Critics argue that it will be very difficult, politically and industrially, to shut down immediately a production line that has the personnel, tooling, and capacity to manufacture four bombers per month. They suggest that the Congress may wish to consider a production schedule that would allow for a more gradual contraction of resources--for example, instead of the currently requested procurement of 48 bombers in 1986, procurement of 36 in 1986 and 12 in 1987. They believe that the current schedule would engender pressures to increase total procurement in order to keep the production line open--perhaps even absorbing funds needed for the Advanced Technology Bomber.

Slowing production of the B-1B might signal to the Soviets a U.S. willingness to offer a further quid pro quo in an area of U.S. strength for Soviet concessions in its area of strength--multiple-warhead ICBMs. The Administration has stated its willingness to negotiate reductions on bombers. Although it is likely that the bomber modernization program could be accommodated under all but the most stringent of bomber reductions, current plans might not be consistent with additional limits on bombers carrying cruise missiles or on cruise missiles themselves.

This alternative would not be likely to save money unless the program was terminated--perhaps after an arms control agreement--before 100 B-1Bs were procured. Otherwise, as with the previous alternative, long-term costs would probably be higher with the slower than with the faster schedule. For example, the Air Force estimates that a plan for stretching procurement to 36 aircraft in 1986 and 12 in 1987 would add $3.6 billion to the total program cost.

Eliminate Research and Development for the Advanced Technology Bomber

The Advanced Technology--or Stealth--Bomber (ATB) is intended to be the penetrating bomber of the late 1990s and the next century. It would replace the B-1B bomber, which would shift to a cruise-missile-carrying role as it became more vulnerable to Soviet air defenses.

Cancelling the ATB research and development program would probably save substantial sums well into the 1990s. Although program costs are classified, it may be possible to estimate their magnitude from the fact that costs for research and development on the B-1B bomber were about $3.4 billion. This is probably a conservative comparison, since the ATB represents an attempt to apply a whole new class of "stealth" technologies to develop a plane that can penetrate advanced Soviet air defenses.

Cancelling R&D would make it much less likely that the United States will have a penetrating bomber toward the end of the century. It would mean stopping a research and development program before it could demonstrate the value of some very promising technologies. Cancelling the ATB would thus be an unattractive option unless it could be done in exchange for Soviet concessions such as curtailment of an apparently large buildup in Soviet bomber forces or substantial reductions in Soviet missile forces. Unfortunately, the Soviets may be more inclined to make concessions for a program already in production, like the B-1B, than for a program still in its infancy.

CONCLUSION

The Congress might also consider other options both for cost reduction and arms control. For example, it might turn its attention to the Administration's Strategic Defense Initiative (known by some as the "Star Wars" approach) for defense against nuclear attack. The Administration currently plans to spend about $21.9 billion over the next five years to begin exploration of the necessary technologies. Most experts believe that deployment of a defensive system as complex as this is still far in the future. Many believe its cost would be enormous, and some doubt that it would be an effective defense. Still others maintain that it would destabilize the strategic situation. Scaling back Administration plans in this area would mean near-term savings in research funds and potential longer-term savings on system deployment.

The analysis in this chapter suggests that it will be difficult--in the absence of arms control--to save substantial amounts of money, especially in the near term, without harming the survivability and effectiveness of U.S.

strategic forces. The Congress has already reviewed and approved major modernization programs in every part of the strategic triad, and it is not likely to alter them without an arms control agreement. Perhaps even more than in the past, therefore, arms control offers the most reasonable hope of achieving substantial cost savings.

APPENDIXES

APPENDIX A. WEAPONS-COUNTING ASSUMPTIONS

All of the numerical comparisons in this study are based on weapons-counting rules derived from past arms control agreements, most of them from agreements and understandings reached in the Strategic Arms Limitation Talks (SALT) negotiating process. 1/ Some of the rules, especially for newer systems, are assumptions CBO has made that are consistent with SALT. Any future arms reductions agreement will require its own rules, which will be hammered out in the negotiating process, but for analytical purposes CBO has assumed the rules described here.

Strategic offensive forces require, broadly speaking, three major types of counting rules. Specific provisions for each would be necessary in any agreement based on reducing and restricting the number of nuclear warheads, as in START/Build-down:

Counting Rules for Strategic Nuclear Delivery Vehicles (SNDV) to indicate which systems are deemed capable of launching or delivering strategic nuclear weapons and under what circumstances they would be counted. 2/ In this study CBO relies primarily on the SALT II definitions of SNDVs for counting purposes. A major exception is the inclusion of both the Soviet Backfire bombers and U.S. FB-111 medium-range bombers in the weapons counts. Tables A-1 and A-2 show these counts for U.S. and Soviet weapons systems, respectively. An interesting subset of these rules deals with how existing systems must be dismantled so as to remove them from the inventory.

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1. The resulting "arms control" inventory counts may differ from "operational" inventories because of differences in weapons counting versus weapons deployment. A new ballistic missile submarine may count for arms control purposes as it begins its sea trial period, several months before it can be operationally deployed. On the other hand, a missile launcher may continue to count for arms control purposes until it has been completely disassembled even though the missile itself has been removed.

2. For example, would all ballistic missiles--including spares--be counted, or just those in launchers?

Counting Rules for the Number of Weapons per Launcher to provide a consistent way to count the number of nuclear weapons per delivery system, regardless of particular operational configurations. Here again CBO assumes the rules used in SALT II, which address only ballistic missiles and are based on the maximum number of weapons flight-tested on each missile. Analogous counts have been devised for future systems. Rules like these have not been developed for strategic bombers in the past because of the reportedly wide variation in operational loadings of aircraft. Tables A-1 and A-2 show the warhead assumptions for both U.S. and Soviet forces.

Rules Setting Limits on the Development and Deployment of New Systems that attempt to bracket the range of possibilities for new systems or to limit the allowable modifications to existing systems under an arms control agreement. Under SALT II, for example, only one "new type" of ICBM is allowed. Similarly, SALT II establishes rules for permissible increases in the size of existing ICBMs and launchers. Once again, CBO generally assumes the SALT II rules in this analysis. The major exception is the one-new-missile rule, which is assumed to expire with the original 1985 SALT II expiration date.

TABLE A-1. WEAPONS-COUNTING ASSUMPTIONS FOR U.S. STRATEGIC FORCES (At the end of fiscal year 1984, unless otherwise noted)

System	Arms Control		Operational	
	SNDV a/	Warheads	SNDV a/	Warheads
Land-Based Missiles				
Titan	35	1	35	1
Minuteman II	450	1	450	1
Minuteman III	550	3 b/	550	3
MX*	100	10	100	10
SICBM*	1,000	1	1,000	1
Sea-Based Forces				
C-3 (Poseidon)	304	14 c/	240	10
C-4 (Poseidon)	192	8	112	8
C-4 (Trident)	120	8	72	8
D-5 (Trident)*	480	8	About 300	8
Bomber Forces				
B-52	529	4-20 d/	241	f/
FB-111 e/	56	6	56	f/
B-1*	100	12-20 d/	90	f/
ATB*	About 125	12	About 110	f/

* = Future System

a. Strategic Nuclear Delivery Vehicle.

b. SALT II Agreed Statements show this as seven. This is the result of a series of demonstration tests conducted several years ago. Many believe that the lower number would be more acceptable to both sides under START/Build-down.

c. Warheads per missile.

d. Assumed number would depend on stated role of aircraft.

e. FB-111 is not considered a heavy bomber in SALT II.

f. Number varies by role and mission.

TABLE A-2. WEAPONS-COUNTING ASSUMPTIONS FOR SOVIET STRATEGIC FORCES (At the end of fiscal year 1984, unless otherwise noted)

System	Arms Control		Operational	
	SNDV a/	Warheads	SNDV a/	Warheads
Land-Based Missiles				
SS-11	520	1	N/A	1
SS-13	60	1	N/A	1
SS-17	150	4	N/A	1-4
SS-18/Follow-on	308	10	N/A	1-10
SS-19/Follow-on	360	6	N/A	1-6
SS-X-24*	150	10	N/A	N/A
SS-X-25*	500	1	N/A	N/A
Sea-Based Forces				
SS-N-6 (Yankee)	368	1 b/	N/A	1
SS-N-8 (Delta I,II)	280	1	N/A	1
SS-N-18/Follow-on (Delta III)	240	7	N/A	1-7
SS-N-20 (Typhoon)	40	9	N/A	6-9
Bomber Forces				
Bear	100	4	N/A	N/A
Bison	50	4	N/A	N/A
Backfire	100 c/	4	N/A	N/A
Blackjack*	100-150	12-20	N/A	N/A
Bear CMC*	50	20	N/A	N/A

N/A = Not Available

* = Future System

a. Strategic Nuclear Delivery Vehicle

b. Warheads per missile

c. Backfire is not considered a heavy bomber in SALT II.

APPENDIX B. POTENTIAL DESTRUCTIVE CAPACITY AND THE DOUBLE BUILD-DOWN CONCEPT

Some analysts within the Administration and elsewhere have expressed concern that even at reduced warhead levels, like those proposed in START/Build-down, the potential destructive capacity of the Soviet missile force--as measured by ballistic missile throwweight--will still be unacceptably high. 1/ This potential destructive capacity could conceivably be reduced through a separate build-down mechanism added to the previously described terms of START/Build-down; hence, the name "double build-down." Some believe that a double build-down could be used to reach equality in the overall destructive capacity of both forces, including Soviet missiles and U.S. bombers. Others see it as a way to narrow the differences. This appendix discusses how such a procedure might work, some measures of potential destructive capacity, and what the effects on U.S. and Soviet forces could be.

How a Double Build-down Might Operate

A double build-down on potential destructive capacity could operate either consecutively or concurrently with the other terms of START/Build-down. In the former case it would, in effect, be a "second phase" of the process, beginning after reaching the warhead plateau and used to reach deeper reductions in destructive capacity than previously obtained through warhead reductions alone. In the case of concurrent operation, the double build-down would add additional constraints to the START/Build-down process, with the most binding of the restrictions being dominant in any given year. 2/ Another possibility along these lines would be to set a plateau on destructive capacity to be reached by a certain time, but not specify a guaranteed annual reductions percentage like the one used for warhead reductions. Because destructive capacity is correlated with potential weapons and not actual weapons, this relatively simple approach might be a more appealing way to reach lower levels of destructive capacity.

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1. The concern is that the potential capacity could be turned into more warheads or more explosive power per missile as Soviet technology improves.

2. The other restrictions would be the guaranteed annual warhead reductions and the build-down on ballistic missile warheads.

Some Measures of Potential Destructive Capacity

As noted above, the large Soviet advantage in ballistic missile throwweight has been of concern to U.S. strategic planners for a number of years. The Soviets, on the other hand, have expressed uneasiness about the larger U.S. force of strategic bombers and air-launched cruise missiles, and have built up a substantial air defense system to defend against it. 3/ In addressing the subject of negotiating START/Build-down, President Reagan has noted that a trade-off of Soviet missiles for U.S. bombers might be needed to help the reductions process move toward more stable forces. 4/ A single measure that incorporates the destructive capacity of both missiles and bombers could be useful in making these trades.

After a brief review of the issues surrounding ballistic missile throwweight, this appendix examines two measures that have been suggested as being better indicators of forcewide destructive capacity than throwweight.

Throwweight. Because it is essentially a measure of ballistic missile lifting power, throwweight is limited as a measure of forcewide destructive capacity. Concentration on building down throwweight would, by excluding the bomber forces, for which no commonly accepted definition of throwweight exists, limit freedom-to-mix in achieving reductions. The Soviets currently hold a 3-to-1 advantage over the United States in ballistic missile throwweight and would be likely to retain a 1.5-to-1 advantage under the 5,000-warhead limit of START/Build-down. These initial and final inequalities may make a double build-down unacceptable to either side, since the Soviets would not accept less throwweight and the United States would not accept smaller reductions than could be achieved by START/Build-down alone. Nevertheless, it is interesting to compare the effects of reductions in other measures of destructive capacity with this measure of longstanding concern to U.S. planners.

Destructive Capacity Measure 1 (Frye). This measure, devised by Alton Frye of the Council on Foreign Relations, attempts to take account simultaneously of missile throwweight, bomber payload, and the operational

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3. Should the Soviets decide to expand their bomber and cruise missile forces, as seems likely, defending against this threat may become of greater concern to the United States in the future.

4. See "Text of Remarks by the President on Strategic Arms Reductions Talks," Office of the Press Secretary, The White House, October 4, 1983.

differences between missiles and bombers. 5/ Bomber payload is defined to be one-tenth of the bomber's maximum gross takeoff weight. To determine the bomber's "throwweight," this calculated payload is then discounted by one-half to account for the bomber's slower delivery time, lower alert rate, and greater difficulty in reaching defended targets as compared with ballistic missiles. The result--aggregated over all bombers in the force--is then added to total ballistic missile throwweight to calculate forcewide destructive capacity. A most interesting feature of this measure is that it portrays the currently disparate force structures of both sides as being nearly equal. That is, the large Soviet advantage in ballistic missile throwweight is offset by the large U.S. advantage in bombers in these terms. This would be true given weapons-counting assumptions based on SALT II, and also including Soviet Backfire bombers assigned to long-range air forces. The current parity shown by this measure might make it easier to use it to achieve equal, lower levels.

Destructive Capacity Measure 2 (Kent). This second measure, by retired Air Force General Glenn Kent of the Rand Corporation, is based on the construct of a "standard weapon station." 6/ It represents another way of handling the differences in destructive capacity between bombers and ballistic missiles. For a ballistic missile, the number of standard weapons stations is calculated using the missile's throwweight, the maximum number of warheads tested on it, and a technology-based constant that relates missile throwweight to potential numbers of warheads. For a bomber, the number of standard weapon stations is calculated from its maximum gross take-off weight and separate constants that relate weight to the maximum number and types of weapons carried. Total force destructive capacity in terms of standard weapon stations is thus the sum of the weapon station counts for individual force elements. Like the Frye measure, this approach shows the current forces of both sides to be approximately equal, thereby offering a basis for achieving equality at reduced levels.

START/Build-down Would Reduce Destructive Capacity of Both Sides

Substantial decreases in all of these measures of destructive capacity would result by the mid-1990s from reductions in the 5,000-ballistic-missile-

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5. See Alton Frye, "Constraining Potential Destructive Capacity in Strategic Forces" (September 1983, processed).

6. See General Glenn Kent, USAF (Ret.), "Key Aspects of Compulsory Double Build-Down Approach" (September 6, 1983, processed).

warhead level specified in START/Build-down. These lower levels of destructive capacity would come about under START/Build-down if both sides were to maintain their current force structure tendencies and the Soviets were to expand their bomber force. None of these measures, however, would show equality between the forces in destructive capacity even at reduced, equal warhead levels.

Table B-1 shows that while START/Build-down would extract relatively larger percentage cuts in Soviet ballistic missile throwweight, it would apparently be somewhat less effective--relative to the United States--in terms of the other two measures of destructive capacity. This is primarily because the Frye and Kent measures, which take account of strategic bombers, both include a substantial amount of initial U.S. destructive capacity in the mothballed--but SALT-accountable--portions of the B-52 bomber fleet. CBO assumes, however, that none of this "phantom" capability would still exist by the mid-1990s. Table B-1 also shows similar results, although at larger absolute levels, if a higher warhead plateau--say 7,000 warheads--was adopted by the START/Build-down negotiations.

Building Down to Lower Levels of Destructive Capacity

Still lower levels of destructive capacity than would result from START/Build-down could be achieved in the mid-1990s by implementing some form of double build-down, but in some cases more warheads than called for by START/Build-down would have to be retired. Reaching equal and lower levels as measured by either the Frye or Kent measures could involve some more difficult force structure decisions than those called for under START/Build-down.

Reaching levels of roughly one-half the 1984 totals for either the Frye or the Kent destructive capacity measure--a level suggested by some Congressional build-down supporters--would seem to be easier for the United States than the Soviet Union. Without affecting their 5,000 ballistic missile warheads U.S. forces could reach the lower levels of potential destructive capacity by retiring about two-thirds of the planned remaining force of B-52s configured to carry the air-launched cruise missile. The Soviets, on the other hand, would probably need to trade away any remaining heavy ICBMs in their arsenal for newer, presumably lighter missiles so as to minimize the cutbacks in bombers and submarines while maintaining 5,000 missile warheads. Even then they might have to reduce numbers of existing Backfire bombers and planned numbers of new Blackjack bombers to meet a goal of one-half their 1984 level of destructive capacity.

Cutting destructive capacity by more than one-half of 1984 levels would necessitate still more major force-structure decisions for both sides.

TABLE B-1. CHANGES IN THREE MEASURES OF POTENTIAL DESTRUCTIVE CAPACITY UNDER START/BUILD-DOWN WITH 5,000- AND 7,000-WARHEAD PLATEAUS

	Ballistic Missile Throwweight (millions of pounds)	Destructive Capacity Measure 1 (Frye) a/ (millions of pounds)	Destructive Capacity Measure 2 (Kent) a/ (thousands of std. weapon stations)
		5,000-Warhead Plateau	
United States			
1984	4.0	17.4	16.4
1996	3.4	10.1	9.4
Change (Percent)	-15	-42	-43
Soviet Union			
1984	11.9	16.6	16.3
1996	5.2	11.2	10.0
Change (Percent)	-56	-33	-39
		7,000-Warhead Plateau	
United States			
1984	4.0	17.4	16.4
1996	4.7	11.4	11.4
Change (Percent)	+18	-35	-30
Soviet Union			
1984	11.9	16.6	16.3
1996	8.0	13.9	12.9
Change (Percent)	-33	-16	-18

a. Both of these measures include bombers, whereas ballistic missile throwweight does not.

Both the U.S. and Soviet future bomber forces will contain much destructive capacity by either the Frye or the Kent measure, but it might not be desirable, from the viewpoint of stability in a crisis, to make further cuts in these forces. If further reductions in Soviet ballistic missile throwweight were the goal, they might have to be achieved either directly, through still lower warhead plateaus than in START/Build-down, or by adding additional constraints on heavier missiles.

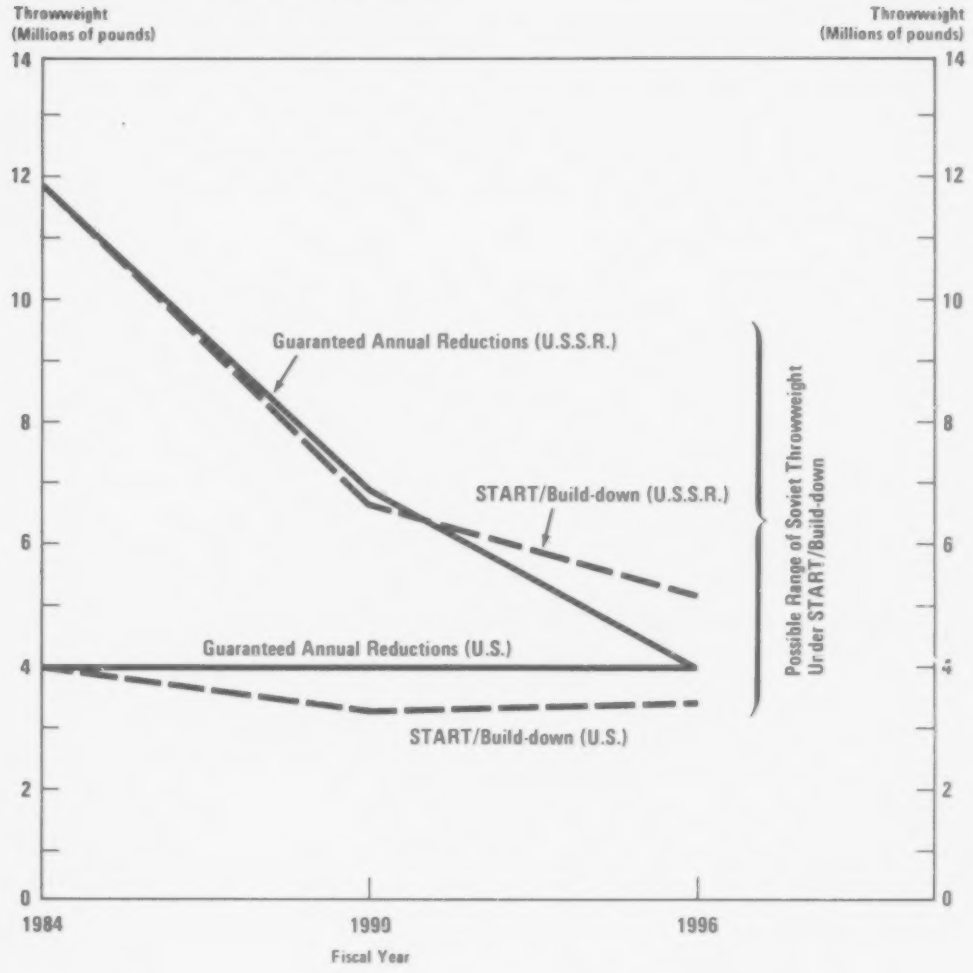
As Table B-1 shows, the Soviets would retain more ballistic missile throwweight than the United States even after the rather steep reductions associated with START/Build-down. Forcing a trade-off of heavier SS-18s for new SS-X-24 ICBMs could reduce the disparity a bit, but would still leave the Soviets with a 1.4-to-1 advantage. The question, then, is whether U.S. security interests would be best served under START/Build-down by seeking equality in throwweight at the lower U.S. level, at some higher level, or by forgoing further attempts at directly limiting Soviet throwweight. The solution is not immediately obvious. Future U.S. policy will be the outcome of decisions on force structure made in the context of these arms control issues.

An Example of a Double Build-down

A simple example of how a double build-down might operate illustrates many of the points made above. Assume that both sides agreed to an equal level of ballistic throwweight--say, 4 million pounds. This would be lower than the 5.2 million pounds of Soviet throwweight likely under the 5,000-warhead limit of START/Build-down given CBO's assumptions about full Soviet modernization. Suppose further that the parties had to reach this lower limit by 1995 (as with the warhead plateau), and that the throwweight would be reduced by guaranteed annual amounts down to the 4-million-pound limit.

The effect of this agreement on the throwweight of both sides is shown in Figure B-1. Since the U.S. force begins with 4 million pounds of throwweight, no further reduction of throwweight is required, although a consequence of START/Build-down would be less U.S. throwweight than today. The Soviet case is the more interesting. Guaranteed annual reductions in Soviet throwweight of about 11 percent would result in achievement of the 4-million-pound limit by 1995. Through about 1990, START/Build-down would generate throwweight reductions exceeding this amount. Thus, the double build-down would not constrain the reductions process. By the early 1990s, however, START/Build-down would no longer keep pace with the throwweight reductions required by the double build-down; hence, from this point on the throwweight constraint would govern the reductions process, bringing the double build-down into play.

Figure B-1.
Illustration of Double Build-down



Interestingly, it is unclear just what the final force structure resulting from this new constraint might be. Again, as Figure B-1 illustrates, the possible range of Soviet ballistic missile throwweight under a 5,000-warhead START/Build-down limit is quite large, ranging from about 3 million pounds to over 9 million pounds. Reaching the bottom end of this scale would necessitate some substantial restructuring of Soviet missile forces and/or considerable Soviet technological improvement in obtaining the most effect from a given amount of throwweight.

APPENDIX C. U.S. AND SOVIET FORCES UNDER START/BUILD-DOWN

TABLE C-1. ASSUMED U.S. STRATEGIC FORCE INVENTORIES UNDER THE ADMINISTRATION'S START/BUILD-DOWN PROPOSAL (By fiscal year)

System	1984	1990	1996
Titan II	35	0	0
Minuteman II	450	150	0
Minuteman III	550	250	0
MX	0	100	35
SICBM	0	0	1,000
Poseidon (C-3)	19	6	0
Poseidon (C-4)	12	8	0
Trident (C-4)	5	8	3
Trident (D-5)	0	4	16
FB-111A	56	0	0
B-52	424	0	75
B-52 (ALCM)	105	200	0
B-1B	0	100	100
ATB	0	0	125

TABLE C-2. ASSUMED SOVIET STRATEGIC FORCE INVENTORIES UNDER THE ADMINISTRATION'S START/BUILD-DOWN PROPOSAL (By fiscal year)

System	1984	1990	1996
SS-11	520	150	0
SS-13	60	0	0
SS-17	150	0	0
SS-18/Follow-on	308	170	45
SS-19/Follow-on	360	0	0
SS-X-24	0	150	150
SS-X-25	0	150	500
Yankee (SS-N-6)	23	0	0
Delta I, II (SS-N-8)	22	4	0
Delta III (SS-N-18/Follow-on)	15	15	7
Typhoon (SS-N-20)	2	8	10
Bear	100	0	0
Bison	50	0	0
Backfire LRA	100	125	125
Blackjack	0	50	125
Bear H (CMC)	0	50	50